DOCUMENT RESUME

ED 142 841 CE 012 452

AUTHOR Mercer, R. J., Ed.
TITLE Forestry Occupations. A Curriculum Guide.
INSTITUTION Clemson Univ., S.C. Vocational Education Media Center.
SPONS AGENCY South Carolina State Dept. of Education, Columbia. Agricultural Education Section.
PUB DATE 73
NOTE 530p.

EDRS PRICE MF-$1.00 HC-$28.79 Plus Postage.
DESCRIPTORS Agricultural Engineering; *Behavioral Objectives; Career Education; Career Exploration; Curriculum Guides; Equipment; Equipment Maintenance; Fire Science Education; *Forestry; *Forestry Occupations; Harvesting; *Learning Activities; Lumber Industry; Management; Recreation; Resource Materials; Secondary Education; Trees; Vocational Agriculture; Vocational Education
IDENTIFIERS South Carolina

ABSTRACT

Developed as a part of a larger project to revise the total agricultural education curriculum in South Carolina, this curriculum guide is designed for a 2-year course in forestry occupations. A paradigm accompanies the document and illustrates a possible time frame and sequence. The units covered by the curriculum include an orientation to forestry occupations; tree and wood identification and use; forestry mechanics (eight subunits); establishment and management of forests (seven subunits); forest fire control (one subunit); forest recreation (one subunit); harvest planning and management (seven subunits); harvest operations (four subunits); and timber processing (one subunit). Subunits are either functional or supportive, with each providing objectives, suggested learning activities, a topic outline, and suggested resources. The appendixes include lists of facilities, equipment, and resource agencies and a compiled bibliography. (BM)

*********************************************************************
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
*********************************************************************

ED142841

# Forestry Occupations

## A Curriculum Guide

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Prepared by:

State Department of Education
Office of Vocational Education
Agricultural Education Section
Columbia, South Carolina 29201

In Cooperation With:

Vocational Education Media Center
Clemson University
Clemson, South Carolina 29631

1973

CE 012 452

# Foreword

This curriculum guide was developed as a part of a larger project to revise the total agricultural education curriculum in South Carolina. The project was designed to implement the following changes:

- provide a more comprehensive vocational offering
- place a greater emphasis on behavioral objectives
- place a greater emphasis on learning activities
- encourage an inductive approach to teaching
- result in the re-identification of the units of instruction

Units of instruction for each course were developed which include behaviorally stated objectives, suggested learning activities, a topic outline, and suggested resources.

Frank R. Stover, State Supervisor
Agricultural Education

## Acknowledgements

Grateful appreciation is extended to the following persons who contributed to the development of the guide:

Mr. J.E. Gore, Berkeley High School, Moncks Corner, South Carolina; Mr. W.P. Lloyd, Ruffin High School, Ruffin, South Carolina; Mr. James L. Mason, Summerville High School, Summerville, South Carolina.

Mr. W.R. Carter, who coordinated the development of the guide.

The final copy was edited by Dr. R.J. Mercer, Vocational Instructional Materials Specialist, Vocational Education Media Center, Clemson, South Carolina.

Illustrations were prepared by R.D. Mattox, Art Director, Vocational Education Media Center, Clemson, South Carolina. Editing was by Mrs. Joyce Farr and typing by Mrs. Lauren Manley.

## Contents

Page

Rationale for a course in Forestry Occupations . . . . . . . . . . . . . . . . . . . . 1

Curriculum Framework . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 3

Curriculum Paradigm . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 5

Use of the Guide . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 7

Horizontal Supportive Units:

Orientation . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9

Tree and Wood Identification and Use . . . . . . . . . . . . . . . . . . . . . . . 15

Forestry Mechanics

Functional Subunits:

General Shop Skills . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 23

Engine Principles . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 27

Engine Trouble Shooting and Repair . . . . . . . . . . . . . . . . . . . . . . 33

Small Gasoline Engines . . . . . . . . . . . . . . . . . . . . . . . . . . . . 45

Major Systems of a Vehicle. . . . . . . . . . . . . . . . . . . . . . . . . . . 53

Hydraulics . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 59

Machinery and Equipment Maintenance . . . . . . . . . . . . . . . . . . . . . 65

Exploring Careers . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 73

Functional Units:

Establishment and Management of Forests

Functional Subunits:

Establishment and Management of New Plantations . . . . . . . . . . . . . . . 77
Managing Existing Plantations . . . . . . . . . . . . . . . . . . . . . . . . 91

Vertical Supportive Subunits:

Forest Ecology . . . . . . . . . . . . . . . . . . . . . . . . 99
Tree Growth . . . . . . . . . . . . . . . . . . . . . . . . . . 107
Production Economics . . . . . . . . . . . . . . . . . . . . . 113
Pest Control . . . . . . . . . . . . . . . . . . . . . . . . . 117
Exploring Careers . . . . . . . . . . . . . . . . . . . . . . . 127
Forest Fire Control . . . . . . . . . . . . . . . . . . . . . . . . . . . 133

Vertical Supportive Subunit:

Exploring Careers . . . . . . . . . . . . . . . . . . . . . . . 141
Forest Recreation . . . . . . . . . . . . . . . . . . . . . . . . . . . . 147

Vertical Supportive Subunit:

Exploring Careers . . . . . . . . . . . . . . . . . . . . . . . 157

Harvest Planning and Management

Functional Subunits:

System Selection . . . . . . . . . . . . . . . . . . . . . . . . . . 163
Machinery and Equipment Selection . . . . . . . . . . . . . . . . . . . . 169
Operational Planning . . . . . . . . . . . . . . . . . . . . . . . . . 183
Cost Analysis . . . . . . . . . . . . . . . . . . . . . . . . . . . . 189
Records and Insurance . . . . . . . . . . . . . . . . . . . . . . . . . 195

Vertical Supportive Subunits:

Cruising . . . . . . . . . . . . . . . . . . . . . . . . . . . 203
Exploring Careers . . . . . . . . . . . . . . . . . . . . . . . 209

Harvest Operations

Functional Subunits:

Felling, Limbing and Bucking . . . . . . . . . . . . . . . . . . . . . 215
Skidding and Prehauling . . . . . . . . . . . . . . . . . . . . . . . . 221
Loading and Hauling . . . . . . . . . . . . . . . . . . . . . . . . . . 227

Vertical Supportive Subunit:

Exploring Careers . . . . . . . . . . . . . . . . . . . . . . . 237

Timber Processing . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 243

Vertical Supportive Subunit:

Exploring Careers . . . . . . . . . . . . . . . . . . . . . . . 255

Appendix A . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 261

Appendix B . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 263

Bibliography . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 265

# Rationale for the Course

Nearly two-thirds of the state of South Carolina is in forests. Sawtimber and/or pulpwood is grown in every county of the state. According to the South Carolina Department of Labor, there were in 1970 approximately 28,000 people employed in the timber industry.*

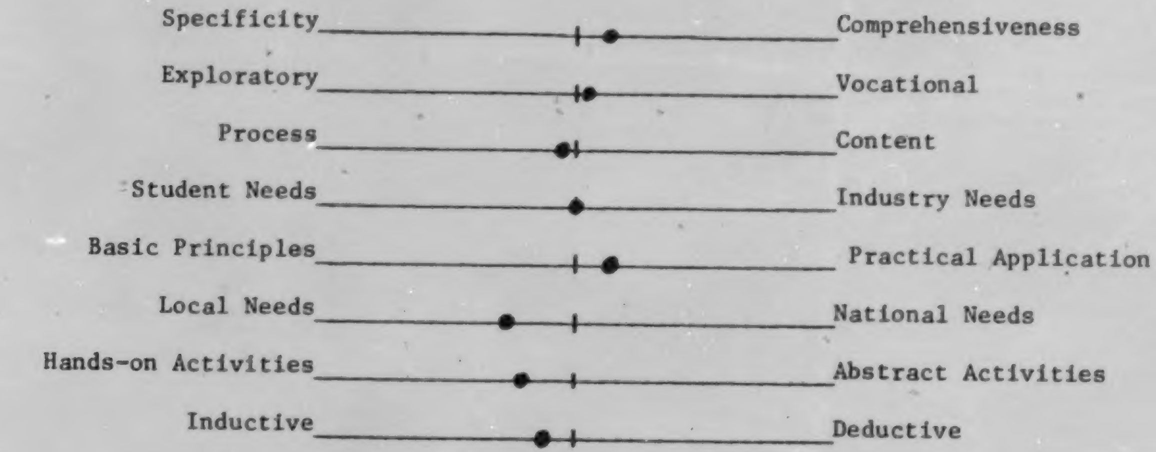
Increased mechanization and forest management technology demand trained personnel for positions in this field. Many high schools in South Carolina offer courses in forestry occupations. It is hoped that this curriculum guide will help teachers expand and improve their effort in this field.

---

*South Carolina Department of Labor, 1970 Report and data from South Carolina State Forestry Commission.

# Curriculum Framework

The designers of this course used the following continuums to frame their thinking as they constructed the course. The designers tried to consider both ends of these continuums. The biases of the committee are indicated below. For example, the committee felt that at the high school level they would prefer comprehensiveness to specificity. In other words, they felt that to be taking a course in forestry occupations is specialization enough at the high school level. Hence, within the context of the course as indicated by the dot on the continuum, the committee leaned toward comprehensiveness.


Specificity
Comprehensiveness
Exploratory
Vocational
Process
Content
Student Needs
Industry Needs
Basic Principles
Practical Application
Local Needs
National Needs
Hands-on Activities
Abstract Activities
Inductive
Deductive

## CURRICULUM PARADIGM
## FORESTRY OCCUPATIONS (2 YEARS)

| Establishment and Management of Forests | Forest Fire Control | Forest Recreation | Harvesting | | Timber Processing |
|---|---|---|---|---|---|
| | | | Harvest Planning | Harvest Operations | |
| Orientation (FFA Career Exploration Supervised (Practice) 1 week | | | | | |
| Tree Identification 1 week | | | | | |
| Forestry Machinery and Mechanics 6 weeks | | | | | |
| Establishment and Management of New Plantations 5 weeks<br>Managing Existing Plantations 5 weeks<br>Forest Ecology 1 week<br>Tree Growth 1 week<br>Production Economics 1 week<br>Pest Control 1 week<br>Exploring Careers ½ week | Forest Fire Control 8 weeks<br>Exploring Careers ½ week | Forest Recreation 8 weeks<br>Exploring Careers ½ week | System Selection 2 weeks<br>Machinery and Equipment Selection 5 weeks<br>Operational Planning 2 weeks<br>Cost Analysis ½ week<br>Records and Insurance ½ week<br>Cruising 1 week<br>Exploring Careers ½ week | Felling, Limbing and Bucking 4 weeks<br>Skidding and Prehauling 4 weeks<br>Loading and Hauling 4 weeks<br>Exploring Careers ½ week | Timber Processing 8 weeks<br>Exploring Careers ½ week |

## Use of the Guide

This guide is not a textbook. It is, as entitled, a curriculum guide. It is not designed to provide content, but to refer to content. It is designed to ask the prior questions - what should be taught and to some degree how and with what resources. The objectives are not behavioral in the truest sense - they may be closer to goals. Hopefully they help spell out the expected outcomes of the course. It was felt that the teachers of the course can determine the "givens" of the objectives and set their own "performance standards" as needed for a particular class or individual.

The general framework of the course is problem solving. To this degree, it is a functional approach. Hopefully, most units will be taught inductively, i.e., the teacher will begin with a practical problem or project and back up to basic principles. It is also hoped that most of the learning activities will be "hands-on" type activities although the importance of vicarious learning is recognized.

This curriculum guide was designed for a two year course. No special sequence is recommended. However, the order in which the guide is assembled offers one alternative. The horizontal supportive units (except for Forestry Mechanics) and the three functional units to the left of the curriculum paradigm (p. 5) might be taught the first year. The three functional units on the right might be taught during the second year. Forestry Mechanics might be taught exclusively in the second year or divided between the first and second year.

**UNIT:** Orientation to Forestry Occupations

**OBJECTIVE(S):** The student will be able to:

I. Describe in outline form the course in forestry occupations.

II. Prepare in outline form a plan for integrating the FFA program and the course.

III. Prepare in outline form a supervised practice program which will enrich the course.

IV. Plan an occupational work experience program to complement the course in forestry occupations.

V. Prepare a plan for exploring careers in forestry occupations.

VI. .....

UNIT: Orientation to Forestry Occupations
SUB-UNIT:

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Describe in outline form the course in forestry occupations.<br>A. List the major objective(s) of each unit.<br>B. List the major learning activity(s) to be accomplished in each unit.<br>C. List the major topic(s) to be covered in each unit.<br>D. List the major resources to be used in each unit.<br>E. ..... | I. Assign a committee to each of the major units and have them critique the unit and report their results to the class with suggestions for change.<br>. Observe a presentation by the instructor of the course model via overhead projection.<br>. ..... |
| II. Prepare in outline form a plan for integrating the FFA program into the course in forestry occupations.<br>A. List possible home or community improvement activities involving forestry which could become projects for FFA.<br>B. List forestry projects suitable as part of the BOAC program.<br>C. List some of the possible radio or TV programs that could be built around forestry activities.<br>D. List some of the team contests that are related to the course.<br>E. List some of the individual contests related to the course.<br>F. ..... | II. Prepare a list of proposed forestry projects for FFA.<br>. Enter FFA contests related to forestry.<br>. Prepare radio or TV programs concerning forestry improvement projects in the local community.<br>. ..... |

**UNIT:** Orientation to Forestry Occupations
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| I. Forestry occupations course<br>A. Objectives<br>B. Learning activities<br>C. Topics<br>D. Resources, facilities, and equipment<br>E. ..... | I. The curriculum guide |
| II. FFA as an integral part of the course<br>A. Committee projects relating to the environment<br>B. Environmental projects related to the BOAC program<br>C. Contests relating to the course<br>. Team<br>. Individual<br>D. FFA summer camp<br>E. TV and radio program projects<br>F. ..... | II. Bender, *et al*. *The FFA and You*. |

**UNIT:** Orientation to Forestry Occupations
**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| III. Prepare in outline form a supervised practice program which will enrich if not form the core of the course.<br>A. List at least two possible home production projects related to forestry.<br>B. List at least two possible home improvement projects related to improving the home forest.<br>C. List at least two supplementary farm jobs related to improvement of the home forest.<br>D. ..... | III. Conduct a home production project related to forestry occupations, e.g., establishing an acre of trees.<br>. Perform a supplemental home or farm job related to forestry occupations, e.g., planting ornamental trees.<br>. Perform a home improvement project related to forestry, e.g., establish a fire lane. |
| IV. Plan an occupational work experience program to complement the course in forestry occupations.<br>A. List at least ____ work stations in your community which would provide training in occupations related to the course.<br>B. Prepare a brief work schedule for occupational work experience at one such station.<br>C. ..... | IV. Make plans for and/or obtain a part-time job in a forestry occupation which will help prepare for a future career.<br>. Prepare a work schedule for a chosen work station.<br>. ..... |
| V. Prepare a brief plan for exploring careers in forestry occupations.<br>A. List at least ____ tests which can be used to analyze personal strengths and weaknesses.<br>B. List at least ____ criteria for evaluating careers.<br>C. ..... | V. Ask for an interview with your guidance counselor to discuss your strengths and weaknesses.<br>. As a class project, try to set up a list of guidelines for evaluating careers as each career area is explored during the course.<br>. ..... |
| VI. ...... | VI. ..... |

**UNIT:** Orientation to Forestry Occupations

**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| III. Integration of the supervised practice program into the course.<br>A. Productive projects<br>B. Home improvement projects<br>C. Supplementary farm jobs<br>D. ..... | III. Miller. *Supervised Practice in Vocational Agriculture*.<br>. ..... |
| IV. Occupational work experience in forestry.<br>A. Locating work experience stations<br>B. Job schedules<br>C. ..... | IV. Binkley. *Experience Programs for Learning Vocations in Agriculture*, Chapter 31.<br>. Fuller. *Education for Agricultural Occupations*.<br>. Hoover. *Handbook of Agricultural Occupations*.<br>. Hanaburgh. *Your Future in Forestry*. |
| V. Career explorations<br>A. Personal assessment<br>. aptitudes<br>. attitudes<br>. skills<br>. general competencies<br>B. Criteria for career evaluation<br>C. ..... | V. Hoover. *Handbook of Agricultural Occupations*, Chapter 1.<br>. Hanaburgh. *Your Future in Forestry*. Chapter 4.<br>. ...... |
| VI. ..... | VI. ..... |

## RESOURCES

UNIT: Orientation to Forestry Occupations

SUB-UNIT:

### BOOKS

Bender, Ralph E.; Clark, Raymond and Taylor, Robert E. The FFA and You. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1962.

Binkley, Harold and Hammonds, Carsie. Experience Programs for Learning Vocations in Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Byram, Harold M. Guidance in Agricultural Education Danville, Illinois: The Interstate Printers and Publishers, Inc.

Fuller, Gerald R. Education for Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc.

Hanaburgh, David H. Your Future in Forestry. New York, N. Y.: Arco Publishing Company, Inc., 1971.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Miller, Texton R. Supervised Practice in Vocational Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc.

### FILMS AND FILM STRIPS

South Carolina State Commission of Forestry
P. O. Box 287, Columbia, S.C. 29202
Man in Green, 28 min.
The American Forester, 14 1/2 min.

### TRANSPARENCIES

32

33

UNIT: Tree and Wood Identification and Use

OBJECTIVE(S): The student will be able to:

I. Identify, without the aid of a key, at least ten trees commonly sold for timber and timber products.

II. With the aid of an identification key, identify at least two of the unknown trees.

III. When given a specific species and size of tree, classify it according to its best use, e.g., saw timber, pulpwood, etc.

IV. When given a sample of one of the more common woods, identify the wood with the aid of a magnifying glass and key.

V. Compare and contrast the more common woods by characteristics such as strength, weight, etc.

VI. When given a specific species of wood, select its most appropriate use.

VII. .....

**UNIT:** Tree and Wood Identification and Use
**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Identify, without the aid of a key, at least ten trees commonly sold for timber products. | I. Locate and label specimen trees in a local forest for identification purposes. |
| A. Draw the silhouette of at least ten trees commonly sold for timber. | . Collect and display pictures of trees grown for timber or timber products in the local area. |
| B. Draw an outline of the leaf of at least ten trees commonly sold for timber. | . Prepare silhouettes of trees for identification and display. |
| | . Prepare leaf molds or prints. |
| C. .... | . Collect leaf specimens for identification purposes. |
| | . ... |
| II. Identify, with the aid of an identification key, at least two of the unknown trees. | II. Practice using an identification key to identify unknown trees. |
| A. Identify and list at least six leaf margins, e.g., entire, serrate, double serrate, etc. | . Prepare and/or obtain drawings of the major leaf forms, types, arrangements, composition, etc. |
| | . Conduct a tree identification contest. |
| | . .... |
| B. Identify and/or diagram at least six leaf apexes, e.g., oval, deltoid, etc. | |

**UNIT:** Tree and Wood Identification and Use
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| I. Tree identification without key<br>. Tree form<br>. Leaf form<br>. ... | I. Bromley. Pulpwood Production. pp. 4-12.<br>. Kirkley, et al. Basic Forestry For Vocational Students in South Carolina. Lesson five.<br>. Film: Identifying Common Tree Species.<br>. .... |
| II. Identification by key<br>A. Leaf margins<br>. Entire<br>. Undulate<br>. Sinuate<br>. Dentate<br>. ...<br>B. Leaf forms<br>. Acicular<br>. Linear<br>. Oblong<br>. Elliptical<br>. Oval<br>. ... | II. Bromley. Pulpwood Production. pp. 4-12.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson five.<br>. Filmstrip: Identifying Common Tree Species.<br>. Bulletin: Familiar Trees in South Carolina.<br>. .... |

**UNIT:** Tree and Wood Identification and Use

**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| C. Identify and/or diagram at least three leaf arrangements, e.g., alternate, opposite, etc. | |
| D. Identify and/or diagram at least three types of leaf composition, e.g., simple, compound, etc. | |
| E. .... | |
| III. When given a specific species and size of tree, classify it according to its best use, e.g., saw timber, pulpwood, poles, fence post, etc. | III. Obtain and/or prepare a chart or poster depicting the tree and its use(s). |
| . .... | . .... |

**UNIT:** Tree and Wood Identification and Use

**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| C. Leaf tips<br>. Acute<br>. Obtuse<br>. ...<br>D. Leaf bases<br>. Oblique<br>. Acute<br>. ...<br>E. Leaf composition<br>. Simple<br>. Compound<br>. ...<br>F. ... | |
| III. Tree Uses<br>. Lumber<br>. Pulpwood<br>. Poles<br>. Cross ties<br>. Fence posts<br>. ... | III. Anderson and Smith. *Forests and Forestry*. Chapter IX.<br>. Bromley. *Pulpwood Production*. pp. 4-12.<br>. Kirkley, *et al*. *Basic Forestry for Vocational Students in South Carolina*. Lesson 14.<br>. .... |

**UNIT:** Tree and Wood Identification and Use
**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| IV. When given a sample of one of the more common woods, identify with the aid of a magnifying glass and key, the wood.<br>A. Diffuse porous, ring porous, and non porous wood.<br>B. Differentiate between wood with broad rays and those without such rays.<br>C. .... | IV. Practice wood identification.<br>. Conduct a wood identification contest.<br>. Prepare and display drawings which compare and contrast porosity, rays and other identifying characteristics.<br>. .... |
| V. Compare and contrast the more common woods (at least ten species) as to hardness, weight, brittleness, etc. | V. As a class project, prepare a chart which compares and contrasts wood specimens according to characteristics such as, hardness, weight, brittleness, etc.<br>. Prepare a collection of wood specimens.<br>. .... |
| VI. Given a specific species of wood, select its most appropriate use(s). | VI. As a class project prepare a chart which depicts the best use(s) of a given species of wood.<br>. .... |
| VII. .... | VII. .... |

**UNIT:** Tree and Wood Identification and Use
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| IV. Wood identification<br>. Porosity<br>. Diffuse porous<br>. Ring porous<br>. Non-porous<br>. ...<br>. Ray determination<br>. ... | IV. Anderson and Smith. Forests and Forestry. pp. 177-181.<br>. Bromley. Pulpwood Production.<br>. .... |
| V. Wood Characteristics<br>. Chemical properties<br>. Physical characteristics<br>. Porous and non-porous<br>. Weight and strength<br>. Bending<br>. ... | V. Anderson and Smith. Forests and Forestry. pp. 173-176.<br>. .... |
| VI. Wood uses by species<br>. Lumber<br>. Pulpwood<br>. Poles<br>. ... | VI. Anderson and Smith. Forests and Forestry. pp. 181-188.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 14.<br>. .... |
| VII. .... | VII. .... |

## RESOURCES

UNIT: Tree and Wood Identification and Use

SUB-UNIT:

### BOOKS

Anderson, David A. and W.A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second ed., 1969.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, SC: Office of Vocational Education in cooperation with the Vocational Education Media Center, 1974.

### FILMS AND FILM STRIPS

Colonial Films, Atlanta, Georgia. Identifying Common Tree Species. Filmstrips I, II, and III.

### BULLETINS

S.C. State Commission of Forestry. Familiar Trees in South Carolina. A manual for tree study. Bulletin 117, Box 287, Columbia, SC 29202.

### TRANSPARENCIES

UNIT: Forestry Mechanics

SUB-UNIT: General Shop Skills

OBJECTIVE(S): The student will be able to:

I. Demonstrate the ability to perform general shop skills.

II. ....

**UNIT:** Forestry Mechanics
**SUB-UNIT:** General Shop Skills

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Demonstrate the ability to perform general shop skills.<br>A. Select and properly use the more commonly used hand wood-working tools, e.g., the handsaw, plane, etc. | I. Observe demonstrations of and/or practice the safe and appropriate use of the more commonly used hand wood-working tools. |
| B. Select and use the more commonly used metal-working or mechanics tools, e.g., wrenches, tap and die sets, etc. | . Observe demonstrations of and/or practice the safe and appropriate use of the more commonly used metal-working or mechanics tools. |
| C. Select, adjust and operate basic power tools, e.g., power saws, electric drills, etc. | . Observe demonstrations of and/or the selection, adjustment and safe operation of and/or practice the safe and appropriate use of the more commonly used power tools. |
| D. Weld an acceptable flat beed using an electric welder. | . Observe demonstrations of and practice the safe and appropriate use of electric welder for very simple welding tasks. |
| E. Perform an acceptable cut and weld a flat beed using an oxyacetylene welder. | . Observe demonstrations of and practice the safe and appropriate use of the oxyacetylene welder for performing very simple cuts and welds. |
| F. .... | . Construct a simple wood-working project.<br>. Construct a simple metal-working project. |
| II. .... | II. .... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** General Shop Skills

| TOPICS | RESOURCES |
|---|---|
| I. Basic shop skills<br>A. Hand tools<br>. Woodworking<br>. Selection<br>. Use<br>. Care<br>. ...<br>B. Metal working<br>. Selection<br>. Use<br>. Care<br>. ...<br>C. Basic power tools<br>. Selection<br>. Adjustment and use<br>. Safety<br>. ...<br>D. Electric welder<br>. Use<br>. Safety<br>. ... | I. Wakeman. The Farm Shop.<br>. Griffin . et al. Basic Oxyacetylene Welding.<br>. O'Brien. Farm Shop Demonstrations.<br>. Film. ABC'S of Hand Tools.<br>. Films, Filmstrips, Transparencies. (Stanley Tool Company offers instructional materials concerning the use of hand tools and power equipment.)<br>. ... |
| II. .... | II. .... |

## RESOURCES

UNIT: Forestry Mechanics
SUB-UNIT: General Shop Skills

### BOOKS

Griffin, Ivan and Roden, Edward M. Basic Oxyacetylene Welding. Albany, NY: Delmar Publishers, 1960.

O'Brien, Michael. Demonstrations for Farm Mechanics. Danville, Illinois: The Interstate Printers and Publishers.

Wakeman, T.J. and McCoy, Vernon. The Farm Shop. New York: The MacMillan Company, 1960.

### FILMS AND FILM STRIPS

Stanley Tool Company.
Write for instructional materials concerning the use of hand tools and power equipment.

### BULLETINS

### TRANSPARENCIES

UNIT: Forestry Mechanics

SUB-UNIT: Engine Principles

OBJECTIVE(S): The student will be able to:

I. Diagram and/or describe in writing the manner in which the gasoline engine converts chemical energy into mechanical energy.

II. List the major systems of the internal combustion engine and state in writing the major function(s) of each.

III. Diagram the working principle fundamental to each of the major engine systems.

IV. Compare and contrast the basic principles of the gasoline and diesel engine.

V. ....

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Principles

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Diagram and/or describe in writing the manner in which the gasoline engine converts chemical energy into mechanical energy.<br>A. List and diagram the 4 strokes of the 4-cycle engine.<br>B. List the function of each stroke of the 4-cycle engine.<br>C. .... | I. Practice diagramming the basic strokes of the 4-cycle engine.<br>· Observe cut-away models of 4-cycle engines.<br>· .... |
| II. List the major systems of the internal combustion engine and state in writing the major function of each.<br>A. Diagram and label the major components of each system and state in writing the function(s) of each.<br>B. Diagram and label the major parts of the engine contained within the block.<br>C. .... | II. Practice diagramming the major engine systems, i.e., power production, carburetion, ignition, cooling, lubrication, etc.<br>· Prepare an ignition system model made of an old distributor coil and plugs.<br>· Prepare a carburetor cut-away by sawing an old carburetor in half.<br>· Illustrate the basic principles of carburetion with an atomizer.<br>· .... |
| III. Diagram the working principle(s) involved in each of the major systems (power production, carburetion, ignition, cooling, lubrication, etc.) | III. Observe and/or construct illustrations of the basic principles of the cooling system, e.g., surface area - observe the difference in water cooling in a large flat pan and water cooling in a pail.<br>· Observe and/or perform demonstrations of the basic principles of lubrication system, e.g., cushioning, cooling, friction reduction, cleaning, sealing, etc. Construct a simple inclined plane and compare the effect of oiling to reduce friction. Illustrate cushioning by placing oil between two metal parts and striking with a hammer.<br>· .... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Principles

| TOPICS | RESOURCES |
|---|---|
| I. Engine Principles<br>. Strokes<br>. Intake<br>. Compression<br>. Ignition<br>. Power<br>. ... | I. Bromley. Pulpwood Production. Unit H.<br>. Deere and Co. Fundamentals of Service - Engines. pp. 1-19.<br>. .... |
| II. Major systems<br>. Power production (block)<br>. Carburetion<br>. Ignition<br>. Lubrication<br>. Cooling<br>. ... | II. Bromley. Pulpwood Production. Unit H.<br>. Deere and Co. Fundamentals of Service - Engines. Chapters 3, 6, 7, and 8.<br>. .... |
| III. Systems principles<br>. Power<br>. Carburetion<br>. Ignition<br>. Cooling<br>. Lubrication<br>. Exhaust & cleaning<br>. ... | III. Bromley. Pulpwood Production. Unit H.<br>. Deere & Co. Fundamentals of Service - Engines Chapters 3, 6, 7, 8.<br>. .... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Principles

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| IV. Compare and contrast the basic principles of the gasoline and diesel engine. | IV. Practice diagramming the basic strokes of the diesel engine. |
| A. Compare and contrast the ignition systems. | • Observe illustrations of the diesel fuel injector system. |
| B. Compare and contrast the carburetion system. | • Observe and compare the piston rings in the diesel and gasoline engine. |
| C. .... | • .... |
| V. .... | V. .... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Principles

| TOPICS | RESOURCES |
|---|---|
| IV. Diesel and gasoline engine principle comparison | IV. Bromley. Pulpwood Production. Unit H. |
| A. Ignition | . Deere and Co. Fundamentals of Service - Engines. pp. 8-16. |
| B. Carburetion | . .... |
| C. ... | |
| V. .... | V. .... |

## RESOURCES

UNIT: Forestry Mechanics
SUB-UNIT: Engine Principles

| BOOKS | FILMS AND FILM STRIPS |
|---|---|
| Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.<br>Deere and Co. Fundamentals of Service - Engines. Moline, Illinois: Deere and Company, 1968. | |
| BULLETINS | TRANSPARENCIES |
| | |

UNIT: Forestry Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

OBJECTIVE(S): The student will be able to:

I. When given an engine with a more common malfunction, identify the system in which the malfunction has occurred.

II. When given the necessary tools and equipment, disassemble a given system, identify malfunctioning or worn parts, repair or replace such parts, reassemble and adjust the system.

III. ....

**UNIT:** Forestry Mechancis
**SUB-UNIT:** Engine Trouble Shooting and Repair

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. When given an engine with a more common malfunction, identify the system in which the malfunction has occurred.<br>A. Given the system in which one of the more common malfunctions has occurred, identify the malfunctioning component of that system with the aid of required diagnostic equipment.<br>B. List the systems of the more frequently occurring malfunctions within each system.<br>C. ..... | I. Observe engine trouble shooting demonstrations.<br>• Participate in a trouble shooting contest.<br>• Observe demonstrations of trouble shooting through the use of engine testing equipment.<br>• Practice the disassembly and reassembly of engine systems.<br>• ..... |
| II. When given the necessary tools and equipment, disassemble a given system, identify malfunctioning or worn parts, repair or replace such parts, reassemble and adjust the system.<br>A. Given the necessary tools and equipment, disassemble, identify malfunctioning on worn parts, repair and replace such parts, reassemble and adjust the engine block assembly.<br>1. Given the necessary tools and equipment :<br>a. Use a micrometer to measure engine parts to determine wear.<br>b. Remove, grind, and replace valves. | II-A. Observe demonstrations of and/or disassemble and reassemble an engine block.<br>• Practice the use of a micrometer for measuring wear.<br>• As a class project,overhaul,or partially overhaul, an engine block, i.e., replace some major engine components such as the crankshaft or piston assembly.<br>• Observe demonstrations of and/or perform some of the following tasks: (1) grind valves, (2) install rings on a piston, (3) install main bearings, (4) replace a sleeve, (5) replace a crankshaft.<br>• ..... |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Engine Trouble Shooting and Repair

| TOPICS | RESOURCES |
|---|---|
| I. Trouble shooting<br>A. Trouble identification | I. Deere and Co. Fundamentals of Service-Engines. Chapter 2. |
| . Without engine analyzer | . Local mechanics |
| . With engine analyzer | . ..... |
| . ..... | |
| B. ..... | |
| II. Trouble shooting and repairing a given system<br>A. Block assembly repair | II-A. Deere and Co. Fundamentals of Service-Engines. Chapter 2. |
| . Crankshaft replacement | . Manufacturer's manuals |
| . Bearing replacement | . Local mechanics |
| . Piston replacement | . ..... |
| . Piston ring replacement | |
| . Valve grinding or replacement | |
| . ..... | |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Engine Trouble Shooting and Repair

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| c. Remove and replace pistons, piston rings, and sleeves.<br>d. Remove and replace main and insert bearings.<br>e. Remove and replace a crankshaft and piston rod.<br>f. Repair or replace an oil pump.<br>g. .....<br>2. ..... | |
| B. Given the necessary tools and equipment, disassemble, identify malfunctioning or worn parts, and repair or replace parts of the carburetor system.<br>1. Given the appropriate tools and equipment:<br>a. Adjust the carburetor.<br>b. Adjust the intake valves.<br>c. Install a carburetor kit.<br>d. .....<br>2. ..... | B. Observe demonstrations of and/or disassemble and reassemble a carburetor and fuel pump.<br>. Practice installing a carburetor kit.<br>. Observe demonstrations of and/or adjust a carburetor.<br>. Observe demonstrations of and/or adjust engine valves.<br>. ..... |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Engine Trouble Shooting and Repair

| TOPICS | RESOURCES |
|---|---|
| B. Carburetion trouble shooting and repair<br>1. Carburetor kit installation<br>2. Carburetor adjustment<br>3. Intake valve adjustment<br>4. ..... | B. Manufacturer's manuals<br>. AAVIM. Farm Tractor Tune-up and Service Guide.<br>. Deere and Co. Fundamentals of Service-Engines. Chapter 3, pg. 8.<br>. Local mechanics<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Trouble Shooting and Repair

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| C. Given the necessary tools and equipment, disassemble, identify malfunctioning or worn parts, repair or replace such parts, reassemble and adjust the ignition system.<br>1. Given the necessary tools and equipment:<br>a. Test and charge a battery.<br>b. Test a coil.<br>c. Test a spark plug.<br>d. Clean a spark plug.<br>e. Test a plug wire.<br>f. Replace and adjust parts in a distributor.<br>g. Time an engine.<br>h. .....<br>2. . . . . . | C. Observe demonstrations of and/or test a battery, spark plug, spark plug wire coil, and condenser.<br>. Practice cleaning and installing plugs.<br>. Practice removing, replacing and adjusting breaker points.<br>. Practice timing an engine ignition system.<br>. ..... |
| D. Given the necessary tools and equipment, disassemble, identify malfunctioning or worn parts, repair and or replace such parts, reassemble and adjust the lubrication system.<br>1. Given the necessary tools and equipment:<br>a. Test an oil pressure gauge.<br>b. Test an oil pump. | D. Observe demonstrations of and/or test an oil pressure gauge and oil pump.<br>. Practice replacing an oil filter element.<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Trouble Shooting and Repair

| TOPICS | RESOURCES |
|---|---|
| C. Ignition system diagnosis and repair<br>1. Testing<br>· Coils<br>· Condensers<br>· Batteries<br>· Spark plugs<br>· Spark plug wires<br>· .....<br>2. Replacing and adjusting points<br>3. Charging batteries<br>4. Cleaning plugs<br>5. Timing<br>6. ..... | C. Deere and Co. Fundamentals of Service-Engines. Chapter 9.<br>· Local mechanics<br>· ..... |
| D. Lubrication system diagnosis and repair<br>1. Oil pump testing<br>2. Filter replacement<br>3. Pressure gauge testing<br>4. ..... | D. Deere and Co. Fundamentals of Service-Engines. Chapter 7.<br>· Local mechanics<br>· ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Trouble Shooting and Repair

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| c. Replace an oil filter element.<br>d. .....<br>2. ..... | |
| E. Given the necessary tools and equipment, disassemble, identify malfunctioning or worn parts, repair and/or replace such parts, reassemble and adjust the cooling system.<br>1. Given the necessary tools and equipment:<br>a. Test a thermostat.<br>b. Replace a fan belt.<br>c. Test a water pump.<br>d. Replace a water pump.<br>e. Replace a radiator.<br>f. .....<br>2. ..... | E. Observe demonstrations of and/or test a thermostat and temperature gauge.<br>. Practice installing fan belts, water hoses, and water pumps.<br>. ..... |
| F. Given the necessary tools and equipment, disassemble, identify malfunctioning or worn parts, repair and/or replace such parts, reassemble and adjust the air cleaning system.<br>1. Given the necessary tools and equipment:<br>a. Remove and replace an air cleaner element. | F. Observe demonstrations of and/or replace and/or clean the air cleaner.<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB UNIT:** Engine Trouble Shooting and Repair

| TOPICS | RESOURCES |
|---|---|
| E. Cooling system diagnosis and repair<br>1. Testing and replacing water pumps<br>2. Testing and replacing thermostats<br>3. Replacing hoses<br>4. Replacing fan belts<br>5. ..... | E. Deere and Co. Fundamentals of Service-Engines. Chapter 8.<br>. Local mechanics<br>. ..... |
| F. Air cleaning system diagnosis and repair<br>1. Trouble identification<br>2. Repair<br>. Replacing filters<br>. Replacing hose connections<br>. ..... | F. Deere and Co. Fundamentals of Service-Engines.<br>. Local mechanics<br>. Manufacturer's service manuals<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Trouble Shooting and Repair

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| b. Replace hose connections. | |
| c. ..... | |
| 2. ..... | |
| G. Given the necessary tools and equipment, disassemble, identify malfunctioning or worn parts, repair and/or replace such parts, reassemble and adjust the exhaust system. | G. Observe demonstrations of and/or remove and replace a muffler, tail pipe, and manifold gasket. |
| | . ..... |
| 1. Given the necessary tools and equipment: | |
| a. Replace a muffler. | |
| b. Replace a tail pipe. | |
| c. Replace a manifold gasket. | |
| d. ..... | |
| 2. ..... | |
| III. ..... | III. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Engine Trouble Shooting and Repair

| TOPICS | RESOURCES |
|---|---|
| G. Exhaust system diagnosis and repair<br>1. Trouble identification<br>2. Repair or replacement<br>• Replacing exhaust pipe<br>• Replacing tail pipe<br>• Replacing manifold gasket<br>• ..... | G. Deere and Co. Fundamentals of Service-Engines. Chapter 6.<br>• Manufacturer's service manuals<br>• Local mechanics<br>• ..... |
| III. ..... | III. ..... |

RESOURCES

UNIT: Forestry Mechanics

SUB-UNIT: Engine Trouble Shooting and Repair

BOOKS

American Association for Vocational Instructional Materials. Farm Tractor Tune-up and Service Specifications. Athens, Georgia: The Association, 1972.

Deere and Company. Fundamentals of Service-Engines. Moline, Illinois: Deere and Company, 1968.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Forestry Mechanics

SUB-UNIT: Small Gasoline Engines

OBJECTIVE(S): The student will be able to:

I. Select an appropriate engine for a given purpose.

II. Show by diagrams the principles of the small gasoline engine and its major systems.

III. Disassemble, identify worn parts, repair or replace such parts and reassemble each of the major systems of a typical small gasoline engine.

IV. Tune up a typical small gasoline engine.

V. .....

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Small Gasoline Engine

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Select an appropriate engine for a given purpose.<br>A. Compare and contrast small gasoline engine systems.<br>1. Compare and contrast horse power ratings.<br>2. Compare and contrast carburetor systems.<br>3. Compare and contrast ignition systems.<br>4. Compare and contrast starting systems.<br>5. .....<br>B. List the advantages and disadvantages of a given engine for a given purpose.<br>C. ..... | I. As a class project, prepare a classification chart comparing various types and sizes of small gasoline engines.<br>. ..... |
| II. Diagram the operational principles of the small gasoline engine and its systems.<br>A. Diagram and/or label the strokes of a four-cycle engine.<br>B. Diagram and/or label the strokes of a two-cycle engine.<br>C. Illustrate by diagram the basic principles upon which a typical carburetor works.<br>D. Illustrate by diagram the basic principles upon which an ignition system works.<br>E. Illustrate by diagram the basic principles upon which the lubrication system operates. | II. Practice drawing and labeling the strokes of a two and four-cycle engine.<br>. Diagram the basic principles of a typical carburetor.<br>. Diagram the basic principles of a typical ignition system.<br>. Diagram the basic principles of a typical lubrication system.<br>. Diagram the basic principles of the air cooling system.<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Small Gasoline Engine

| TOPICS | RESOURCES |
|---|---|
| I. Engine selection<br>A. Combustion comparison<br>. Two-cycle<br>. Four-cycle<br>. .....<br>B. Type carburetor comparison<br>. Bowl<br>. Vacuum<br>. .....<br>C. Type ignition comparison<br>. Magneto<br>. Battery generator<br>. .....<br>D. ..... | I. AAVIM. Small Gasoline Engines, Vol. 1.<br>. AAVIM. Small Gasoline Engines, Vol. 2.<br>. ..... |
| II. Working principles<br>A. Four-cycle<br>B. Two-cycle<br>C. Carburetor<br>D. Ignition<br>E. Lubrication<br>F. ..... | II. AAVIM. Small Gasoline Engines, Vol. 1.<br>. AAVIM. Small Gasoline Engines, Vol. 2.<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Small Gasoline Engine

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| III. Disassemble, identify worn parts, repair or replace such parts and reassemble each of the major systems of a typical small gasoline engine. | III. Observe a demonstration of and/or disassemble, identify worn parts, repair or replace such parts and reassemble each of the major systems of a typical small gasoline engine. |
| A. Disassemble, identify worn parts, repair or replace such parts, and reassemble the ignition system of a typical small gasoline engine. | A. Observe a demonstration of and/or disassemble, identify worn parts, repair or replace such parts and reassemble the ignition system of a typical small gasoline engine. |
| B. Disassemble, identify worn parts, repair or replace such parts, and reassemble the carburetion system of a typical small gasoline engine. | B. Observe a demonstration of and/or disassemble, identify worn parts, repair or replace such parts and reassemble the carburetion system of a typical small gasoline engine. |
| C. Disassemble, identify worn parts, repair or replace such parts, and reassemble the block of a typical small gasoline engine. | C. Observe a demonstration of and/or disassemble, identify worn parts, repair or replace such parts, and reassemble the block of a typical small gasoline engine. |
| 1. Remove, grind to specifications and replace intake and exhaust valves. | . Remove, grind to specifications and replace intake and exhaust valves. |
| 2. Remove and replace rings according to specifications. | . Remove and replace rings. |
| 3. Remove and replace a piston and rings on a typical small gasoline engine. | . Remove and replace piston and rings. |
| 4. ..... | . Remove and replace crankshaft, connecting rod and bearing. |
| D. ..... | . ..... |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Small Gasoline Engine

| TOPICS | RESOURCES |
|---|---|
| III. Small engine repair<br>. Ignition system<br>. Carburetor<br>. Block<br>. Rings<br>. Piston and rings<br>. Piston, rings and bearing | III. Manufacturer's manual<br>. VEMC. Small Gasoline Engine - Ignition System Repair.<br>. VEMC. Small Gasoline Engine - Bowl-type Carburetor Repair.<br>. AAVIM. Small Engines, Vol. I.<br>. AAVIM. Small Engines, Vol. II.<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Small Gasoline Engine

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| IV. Tune up a typical small gasoline engine. | IV. Practice carburetor adjustment. |
| A. Adjust a carburetor according to specifications for maximum performance. | . Practice point and timing adjustments. |
| B. Adjust the timing according to specifications for maximum performance. | . ..... |
| C. ..... | |
| V. ..... | V. ..... |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Small Gasoline Engine

| TOPICS | RESOURCES |
|---|---|
| IV. Small engine tune up<br>. Adjusting carburetor<br>. Adjusting timing<br>. ..... | IV. Owner's manual<br>. AAVIM. Small Engines, Vol. I.<br>. AAVIM. Small Engines, Vol. II.<br>. VEMC. Small Gasoline Engines Bowl-type Carubretor Repair.<br>. VEMC. Small Gasoline Engines - Ignition System Repair.<br>. ..... |
| V. ..... | V. ..... |

## RESOURCES

UNIT: Forestry Mechanics

SUB-UNIT: Small Gasoline Engine

### BOOKS

American Association for Vocational Instructional Materials. Small Engines, Vol. I. Athens, Ga.: The Association, 1971.

American Association for Vocational Instructional Materials. Small Engines, Vol. II. Athens, Ga.: The Association, 1971.

Vocational Education Media Center. Small Gasoline Engines - Bowl-type Carburetor Repair. Clemson, S. C.: The Center, 1972.

Vocational Education Media Center. Small Gasoline Engines - Ignition System Repair. Clemson, S.C.: The Center, 1972.

### FILMS AND FILM STRIPS

### BULLETINS

### TRANSPARENCIES

UNIT: Forestry Mechanics

SUB-UNIT: Major Systems of a Vehicle

OBJECTIVE(S): The student will be able to:

I. Diagram the major components and working principles of each of the major vehicle systems.

II. Recognize a malfunctioning or maladjusted vehicle system and make needed adjustments.

III. Disassemble, identify malfunctioning or worn parts, repair and replace such parts and reassemble a typical brake.

IV. .....

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Major Systems of a Vehicle

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Diagram the major components and working principle(s) of each of the major vehicle systems. | I. Observe illustrations of and/or prepare diagrams of the major vehicle system. |
| A. Diagram the components and working principles of vehicle brakes. | • Disassemble and reassemble the brake assembly. |
| B. Diagram the components and working principles of the steering assembly. | • ..... |
| C. Diagram the components and working principles of the clutch. | |
| D. Diagram the components and working principles of the transmission. | |
| E. Diagram the components and working principles of the differential. | |
| F. ..... | |
| II. Recognize a malfunctioning or maladjusted vehicle system and make needed adjustments. | II. Observe demonstrations of maladjusted or malfunctioning vehicle systems. |
| A. Adjust a typical brake system. | • Locate the major vehicle adjustment. |
| B. Adjust a typical clutch. | • Practice making adjustments. |
| C. Adjust a typical steering assembly. | • ... |
| D. ..... | |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Major Systems of a Vehicle

| TOPICS | RESOURCES |
|---|---|
| I. Vehicle systems<br>. Brakes<br>. Steering<br>. Clutch<br>. Transmission<br>. Differential<br>. ..... | I. AAVIM. Tractor Transmissions.<br>. Deere and Co. Power Trains.<br>. Manufacturer's service manuals<br>. Local mechanics<br>. ..... |
| II. Vehicle systems adjustment<br>. Brake<br>. Clutch<br>. Steering<br>. ..... | II. AAVIM. Tractor Maintenance. Part 3.<br>. Manufacturer's service manual<br>. Local mechanics<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Major Systems of a Vehicle

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| III. Disassemble, identify malfunctioning or worn parts, repair or replace such parts, and reassemble a typical brake. | III. Observe demonstrations of and/or replace brake shoes and install a cylinder kit. |
| A. Replace brake shoes. | . ..... |
| B. Install a cylinder kit. | |
| C. ..... | |
| IV. ..... | IV. ..... |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Major Systems of a Vehicle

| TOPICS | RESOURCES |
|---|---|
| III. Brake repair<br>· Shoe replacement<br>· Cylinder kit installation<br>· ..... | III. Manufacturer's service manual<br>· ..... |
| IV. ..... | IV. ..... |

## RESOURCES

UNIT: Forestry Mechanics

SUB-UNIT: Major Systems of a Vehicle

| | |
|---|---|
| BOOKS<br>American Association for Vocational Instructional Materials. *Tractor Maintenance*. Athens, Georgia: The Association, 1964.<br>Deere and Company. *Fundamentals of Service-Engines*. Moline, Illinois: Deere and Company, 1968. | FILMS AND FILM STRIPS |
| BULLETINS | TRANSPARENCIES |

UNIT: Forestry Mechanics

SUB-UNIT: Hydraulics

OBJECTIVE(S): The student will be able to:

I. Identify the functions of a given machine which are performed hydraulically.

II. Diagram and/or otherwise describe the basic principle of a hydraulic system.

III. Diagram, label and state the function(s) of the components of a typical hydraulic system.

IV. Disassemble and reassemble a simple hydraulic system.

V. Trouble-shoot a typical hydraulic system.

VI. ......

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Hydraulics

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Identify the functions of a given machine which are performed hydraulically.<br>A. Classify a given hydraulic system as to type, e.g., single action, double action, etc.<br>B. List at least five tasks performed hydraulically by pulpwood harvesting equipment.<br>C. ..... | I. Observe demonstrations of machine functions which are performed hydraulically.<br>. Prepare a list of the functions performed hydraulically on a pulpwood machine such as the knuckle-boom loader.<br>. Invite a local mechanic or equipment dealer to help classify the systems used as to type.<br>. ..... |
| II. Diagram and/or otherwise describe the basic principle of a hydraulic system.<br>A. State Pascal's law.<br>B. When given the small cylinder size and the weight applied to its piston, (when given the size of the large cylinder) determine the weight lifted by its piston.<br>C. ..... | II. Practice solving leverage problems using Pascal's law.<br>. Ask the school physics teacher to demonstrate Pascal's law.<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Hydraulics

| TOPICS | RESOURCES |
|---|---|
| I. Functions performed by hydraulics<br>. Vehicles<br>. Brakes<br>. Steering<br>. .....<br>. Vehicle accessories<br>. Lifts<br>. Grapples<br>. Swings<br>. Shears<br>. Winch | I. AAVIM. Tractor Hydraulics.<br>. Bromley. Pulpwood Production. Unit G.<br>. Local harvesting equipment dealers<br>. ..... |
| II. Basic principles of hydraulics<br>A. Pascal's law<br>B. Leverage problems<br>C. ..... | II. Bromley. Pulpwood Production. Unit G.<br>. Glenn and Bainn. Mobile Hydraulic Testing. Chapter I.<br>. Local school physics or science teacher<br>. High school science or physics book<br>. ..... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Hydraulics

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| III. Diagram, label and state the function(s) of the components of a typical hydraulic system.<br>A. Diagram a typical check valve.<br>B. Diagram a typical pump.<br>C. Diagram a typical directional control valve.<br>D. Diagram a typical relief valve.<br>E. Diagram a typical flow control valve.<br>F. Diagram a typical piston type cylinder.<br>G. ..... | III. Practice diagramming hydraulic circuits.<br>• Design a hydraulic circuit and have it checked for corrections by the instructor.<br>• If feasible construct a very simple hydraulic ram. Tolerances must be close, but perhaps one could be made which would function.<br>• ..... |
| IV. Disassemble and reassemble a simple hydraulic circuit. | IV. Practice disassembling and reassembling a simple circuit. |
| V. Trouble-shoot a typical hydraulic system.<br>A. List at least one cause of a noisy pump.<br>B. List at least one cause of overheating.<br>C. List at least one or two items to check when a pump malfunctions.<br>D. List at least two items to check when pressure is low.<br>E. Identify air and fluid leakage.<br>F. Check fluid level.<br>G. Check supply line.<br>H. ..... | V. Observe demonstrations of and/or demonstrate such things as checking fluid level, checking for leaks, checking pressure, etc.<br>• Obtain and/or prepare a trouble - shooting guide for a typical or particular hydraulic system.<br>• Ask a local mechanic to discuss trouble shooting the hydraulic system.<br>• ..... |
| VI. ... | VI. ... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Hydraulics

| TOPICS | RESOURCES |
|---|---|
| III. Hydraulic circuit<br>• Pump<br>• Cylinder<br>• Valves<br>  • Check<br>  • Relief<br>  • Directional<br>  • ..... | III. AAVIM. Tractor Hydraulics.<br>• Bromley. Pulpwood Production. Unit G.<br>• Deere & Co. Fundamentals of Service-Hydraulics.<br>• Glenn and Bainn. Mobile Hydraulic Testing.<br>• Local pulpwood equipment mechanics or dealers<br>• ..... |
| IV. Disassembly and reassembly of the hydraulic system | IV. Deere & Co. Fundamentals of Service-Hydraulics.<br>• Local pulpwood equipment mechanics or dealers<br>• ..... |
| V. Trouble-shooting<br>• Pumps<br>• Valves<br>• Line leakage<br>• Fluid level<br>• ..... | V. AAVIM. Tractor Hydraulics.<br>• Bromley. Pulpwood Production. Unit G.<br>• Deere & Co. Fundamentals of Service-Hydraulics.<br>• Local equipment mechanics<br>• Manufacturer's owner or service guides<br>• ..... |
| VI. ... | VI. ... |

## RESOURCES

UNIT: Forestry Mechanics
SUB-UNIT: Hydraulics

### BOOKS

American Association for Vocationsl Instructional Materials. Tractor Hydraulics. Athens, Ga.: The Association.

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Deere and Company. Fundamentals of Service-Hydraulics. Moline, Illinois: Deere and Company, 1967.

Glenn, Ronald E. and James E. Bainn. Mobile Hydraulic Testing. Chicago: American Technical Society, 1970.

### FILMS AND FILM STRIPS

### BULLETINS

### TRANSPARENCIES

UNIT: Forestry Mechanics

SUB-UNIT: Machinery and Equipment Maintenance

OBJECTIVE(S): The student will be able to:

I. Plan a maintenance program for the machinery and equipment used in a given forestry harvesting operation.

   A. Plan a lubrication schedule for a given piece of machinery or equipment.
   B. Select an appropriate lubricant for a given use.
   C. Perform the major tasks involved in a typical lubrication program.
   D. Prepare a checklist and schedule of miscellaneous maintenance for a given piece of machinery or equipment.
   E. ....

II. ....

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Machinery and Equipment Maintenance

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Plan a maintenance program for the machinery and equipment used in a given forestry harvesting operation. | I. As a class, small group or individual project, plan a maintenance program for a local harvesting operation .<br>. Ask a local producer to discuss his machinery and equipment maintenance program. |
| A. Plan a lubrication schedule for a given machine or piece of equipment under given use conditions. | A. Individually or in small groups plan a lubrication program for a machine or piece of equipment.<br>. Obtain and use a manufacturer's lubrication schedule for lubricating a machine or piece of equipment.<br>. Determine the lubrication procedure used by a local producer.<br>. .... |
| 1. Prepare a lubrication schedule for a machine, e.g., skidder, tree shear or loader under given use conditions. | |
| 2. Prepare a lubrication schedule for trucks under given use conditions. | |
| 3. Prepare a lubrication schedule for chain saws under given use conditions. | |
| 4. Obtain and interpret the manufacturer's lubrication schedule for a given vehicle or piece of equipment. | |
| 5. .... | |
| B. Select an appropriate lubricant for a given use. | B. Obtain various greases and oils and compare them as to viscosity, etc.<br>. Observe or perform demonstrations of the cushioning friction reduction, sealing, etc., effects of oil.<br>. Make some "homemade" grease using soap and oil.<br>. Obtain oil cans and practice determining government classifications. |
| 1. List the major functions of a lubricant, e.g., cushion, seal, reduce friction, etc. | |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Machinery and Equipment Maintenance

| TOPICS | RESOURCES |
|---|---|
| I. Preventive Maintenance | I. AAVIM. Tractor Maintenance.<br>• AAVIM. Farm Tractor Tune-up Specifications.<br>• Manufacturer's lubrication guides<br>• Local pulpwood machinery mechanics<br>• .... |
| A. Planning a lubrication schedule<br>1. Machinery<br>• Shears<br>• Skidders<br>• Loaders<br>• Trucks<br>• ...<br>2. Equipment<br>• Chain saws<br>• ... | |
| B. Lubricant selection<br>1. Functions of lubricants<br>a. Sealing<br>b. Friction reduction<br>c. Cushioning<br>d. Cleaning<br>e. Cooling<br>f. ... | B. AAVIM. Selecting and Storing Tractor Fuels and Lubricants.<br>• Deere & Co. Fundamentals of Service Fuels, Lubricants and Coolant.<br>• American Petroleum Institute<br>• Slides: AAVIM. Selecting and Storing Tractor Fuels and Lubricants. |

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 2. Compare and contrast lubricants.<br>a. Differentiate between an oil and a grease.<br>b. List the major oil classification.<br>c. List at least 4 types of greases.<br>d. Interpret a label to determine oil classification.<br>e. ....<br>3. When given a specific bearing select the type of oil or grease needed.<br>4. .... | . Using a manufacturer's guide to lubrication, try to explain the reasons for different greases and oils for different bearings and other surfaces to be lubricated.<br>. .... |
| C. Perform the major tasks involved in a lubrication program.<br>1. Locate point of lubrication on a given vehicle or piece of equipment.<br>a. Locate grease fittings<br>b. Locate oil parts<br>c. Transmission entrance<br>d. ...<br>2. Select an appropriate means of greasing or adding oil.<br>3. Operate a grease gun.<br>4. Demonstrate the ability to correctly grease a fitting.<br>5. Check the oil level in an engine.<br>6. .... | C. Practice greasing a machine or piece of equipment using a grease gun.<br>. Observe demonstrations of and/or practice loading a grease gun.<br>. Practice locating fittings to be greased and oil entrance on a machine or piece of equipment.<br>. .... |

| TOPICS | RESOURCES |
|---|---|
| 2. Lubricant classification<br>a. Types of greases<br>· Water pump grease<br>· Ball-and-roller bearing grease<br>· Pressure gun grease<br>· All-purpose grease<br>· Multipurpose grease<br>· ...<br>b. Oils<br>· Gear<br>· Transmission<br>· Hydraulics<br>· Crank case<br>· Weights - 10-20-30<br>· A.P.I. classifications ML, MM, MS, DG | |
| C. Lubrication<br>1. Locating lubrication points<br>· Locating fittings<br>· Locating oil parts<br>· ...<br>2. Selecting equipment<br>3. Operating grease guns<br>4. Checking oil level<br>5. ... | C. AAVIM. Tractor Maintenance.<br>· Local service station operators<br>· Local pulpwood equipment maintenance shop mechanics<br>· Manufacturer's lubrication guides<br>· .... |

**UNIT:** Forestry Mechanics

**SUB-UNIT:** Machinery and Equipment Maintenance

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| D. Prepare a maintenance check list and schedule of miscellaneous items for a given piece of machinery or equipment, e.g., air filter change, water level, tire inflation, etc. | D. As a small group or individual class assignment, prepare a miscellaneous maintenance check list and schedule for a machine or piece of equipment.<br>. .... |
| 1. Perform the more common miscellaneous maintenance items.<br>1. Change an air cleaner filter<br>2. Check tire inflation<br>3. Check fan belts on engines<br>4. ... | . Observe demonstrations of and/or demonstrate the more common maintenance items, e.g., change an air filter element.<br>. ... |
| 2. Interpret a manufacturer's checklist or schedule of miscellaneous maintenance. | . Obtain and use a manufacturer's checklist of miscellaneous maintenance. |
| 3. ... | |
| E. ... | E. ... |
| II. ... | II. ... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Machinery and Equipment Maintenance

| TOPICS | RESOURCES |
|---|---|
| D. Miscellaneous maintenance checklist<br>1. Vehicles<br>a. Electrical System<br>. Battery<br>. Distributor<br>. Wiring<br>. ...<br>b. Cooling<br>. Fan belt<br>. Coolant level<br>. Radiator<br>. ...<br>c. Carburetion<br>. Gas lines<br>. Carburetor sediment bowl<br>. ...<br>d. Air cleaner<br>. Air cleaner element<br>. Hoses<br>. ...<br>e. Tires<br>f. Brakes<br>g. Steering<br>h. Hydraulic system<br>i. ...<br>2. Equipment<br>a. Chain saw<br>. Chain wear<br>. ...<br>b. ....<br>3. ... | D. AAVIM. Tractor Maintenance.<br>. AAVIM. Tractor Operation and Daily Care.<br>. Local pulpwood equipment maintenance shop mechanics<br>. Manufacturer's maintenance or service guides<br>. Slides: AAVIM. Tractor Maintenance.<br>. Slides: AAVIM. Tractor Operation and Daily Care.<br>. ... |
| E. ... | E. ... |
| II. ... | II. ... |

## RESOURCES

UNIT: Forestry Mechanics

SUB-UNIT: Machinery and Equipment Maintenance

### BOOKS

American Association for Vocational Instructional Materials. Selecting and Storing Tractor Fuels and Lubricant. Athens, Georgia: The Association, 1964.

American Association for Vocational Instructional Materials. Tractor Maintenance. Athens, GA: The Association, 1964.

American Association for Vocational Instructional Materials. Tractor Operation and Daily Care. Athens, GA: The Association, 1967.

American Association for Vocational Instructional Materials. Farm Tune-up and Service Specifications. Athens, GA: The Association, 1972

Deere and Co. Fundamentals of Service Fuels, Lubricants and Coolants. Moline, Illinois: Deere and Company, 1970.

### FILMS AND FILM STRIPS

Slides: American Association for Vocational Instructional Materials, Athens, GA.

1. Selecting and Storing Tractor Fuel and Lubricants
2. Tractor Maintenance
3. Tractor Operation and Daily Care

### BULLETINS

### TRANSPARENCIES

UNIT: Forestry Mechanics

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in forestry mechanics with those in other areas of forestry.

II. List the ways in which a given job in forestry mechanics might complement or fail to complement life goals.

III. ....

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Compare and contrast career opportunities in forestry mechanics with those in other areas of forestry.<br>A. List the major job titles related to forestry mechanics.<br>B. Classify these jobs as to level, i.e., professional, technical, service, etc.<br>C. List the major competencies needed for a career in forestry mechanics.<br>D. List the major activities performed by persons employed in forestry mechanics.<br>E. List the educational requirements and sources of such training. | I. Interview as many people employed in forestry mechanics as is feasible.<br>. Prepare a detail job analysis of a job of particular interest.<br>. Practice as many of the tasks performed by employees holding these jobs as is feasible.<br>. Arrange to spend a day or portion of a day with a person employed in forestry mechanics.<br>. Seek occupational work experience as a forestry mechanic's aide.<br>. Investigate with your teacher or guidance counselor the possibility for further training and job opportunities in the local area.<br>. .... |
| II. List the ways in which a given job in forestry mechanics might complement or fail to complement life goals.<br>A. List at least five ways in which a career in forestry mechanics might benefit society.<br>B. List at least five ways in which a career in forestry mechanics might benefit an individual.<br>C. .... | II. Prepare a short paper concerning the ways in which a job in forestry mechanics might complement or fail to complement life goals.<br>. Participate in a class debate of life goals.<br>. Investigate the living conditions and life style of a person employed in forestry mechanics.<br>. .... |
| III. .... | III. .... |

**UNIT:** Forestry Mechanics
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| I. Careers in forestry mechanics<br>A. Career titles<br>. Shop foreman<br>. Welder<br>. Machinist<br>. Mechanic<br>. ....<br>B. Career classification<br>. Professional<br>. Technical<br>. Skill<br>. ....<br>C. Competencies needed<br>D. Major activities<br>E. Educational requirements<br>F. .... | I. Local timber producer<br>. Local school guidance counselor<br>. Local forestry mechanic<br>. .... |
| II. Career evaluation<br>A. Life goals<br>B. Benefits to society<br>C. Benefits to the individual<br>D. .... | II. Hoover. Handbook of Agricultural Occupation. Chapter 1.<br>. Local school guidance counselor<br>. .... |
| III. .... | III. .... |

## RESOURCES

UNIT: Forestry Mechanics
SUB-UNIT: Exploring Careers

BOOKS

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Establishment and Management of Forests

SUB-UNIT: Establishment and Management of New Plantations

OBJECTIVE(S): The student will be able to:

I. Plan the establishment of a given plantation.

II. Select and implement management practices to maximize economic growth for a given plantation.

III. .....

**UNIT:** Establishment and Management of Forests

**SUB-UNIT:** Establishment and Management of New Plantations

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. Plan the establishment of a given tree plantation.<br>A. Given the geographic location, climate, type of soil, purpose of establishment and other relevant data, choose with the aid of appropriate reference materials a suitable variety.<br>1. List at least five tree varieties suitable for timber production.<br>2. Name at least five tree varieties suitable for pulpwood production.<br>3. List at least five tree varieties suitable for Christmas trees.<br>4. Compare and contrast at least five varieties of pines as to their rate of growth, pest resistance, climatic and soil adaptations, storm resistance, and quality of wood for a given purpose.<br>5. ..... | I-A. As a class project, visit sites being planted or prepared for planting and observe the procedures followed.<br>. Interview a local forester to determine typical site preparations and planting techniques.<br>. Obtain and file a reference which lists recommended varieties for South Carolina.<br>. Obtain a reference which compares and contrasts different varieties of pines for lumber production.<br>. Obtain a reference which compares and contrasts varieties of pine for pulpwood production.<br>. Obtain and file a reference which compares and contrasts varieties of pines as to pest resistance, growth rate, economic value, storm resistance, etc.<br>. Interview a local pulpwood company representative to determine the varieties of trees his company recommends or plants in the area.<br>. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Establishment and Management of New Plantations

| TOPICS | RESOURCES |
|---|---|
| I. New plantation establishment<br>A. Variety selection<br>1. Timber species<br>. Hardwoods<br>. Pines<br>. .....<br>2. Pulpwood species<br>. Hardwoods<br>. Pines<br>. .....<br>3. Christmas tree species<br>4. ..... | I. Anderson and Smith. Forests and Forestry. p. 131.<br>. Check with forestry department<br>. Local forester<br>. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Establishment and Management of New Plantations

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| B. Given the site conditions (vegetative cover, terrain, soil type, etc.) select the appropriate preparation practices. | B. Observe site preparation practices being used in the local community to determine the degree to which existing vegetation is removed or controlled, type of soil preparation if any, etc. |
| 1. When given a description and/or picture of the existing vegetation, determine whether or not existing vegetation must be removed or controlled.<br>2. When given a description of the vegetation to be removed, select an appropriate means of removal or control.<br>3. When given a description of the site to be planted, determine the soil preparation needed, if any.<br>4. When given a site description, if mechanical soil preparation of a site is needed, select an appropriate means.<br>5. When given the mechanical means of soil preparation to be used, select appropriate equipment.<br>6. ..... | . If feasible, observe the methods used to clear a site which requires the use of large equipment.<br>. Observe equipment being used to clear away heavy equipment.<br>. If feasible, as a class project, prepare a small site plot for planting.<br>. Visit a site to be prepared for planting and make recommendations as to the amount and type of preparation needed. Check your recommendations with those of a forester.<br>. ..... |
| C. When given the variety to be planted and the geographic location select, with the aid of an appropriate reference, an appropriate planting date. | C. Obtain and file a reference which gives recommended planting dates for varieties.<br>. ..... |

**UNIT:** Establishment and Management of Forests

**SUB-UNIT:** Establishment and Management of New Plantations

| TOPICS | RESOURCES |
|---|---|
| B. Site preparation<br>1. Vegetative cover<br>· Removal<br>· Control<br>2. Methods of removal<br>· Mechanical<br>· Bulldozer<br>· .....<br>· Chemical<br>· Fire<br>· .....<br>3. Soil preparation | B. Anderson and Smith. Forests and Forestry. pp. 133-134.<br>· Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 6.<br>· Local foresters<br>· Clemson University. Getting Open Land Ready for Planting Pines. Information card # 93.<br>· ..... |
| C. Planting date selection | C. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 6.<br>· Local foresters<br>· ..... |

**UNIT:** Establishment and Management of Forests

**SUB-UNIT:** Establishment and Management of New Plantations

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 1. List at least five factors which affect planting dates. | |
| 2. Compare and contrast the four seasons as to planting tree seasons. | |
| 3. ..... | |
| D. When given the variety to be planted, goal of planting, soil type and other relevant data select, with the aid of an appropriate reference, an appropriate spacing. | D. Obtain and file a reference which gives recommended spacing for tree seedlings for various purpose. |
| 1. When given the desired spacing and area to be planted, calculate or interpret tables in an appropriate reference to determine the number of seedlings needed. | |
| 2. List at least one reference which gives variety, spacing, and seedling quantity needed. | |
| 3. Compare and contrast different spacings on rate of growth, quality of timber, control of undergrowth, etc. | |
| 4. ..... | |
| E. List at least one source of tree seedlings in South Carolina. | E. Obtain and file the name and address of a source or sources of tree seedlings in South Carolina. |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Establishment and Management of New Plantations

| TOPICS | RESOURCES |
|---|---|
| D. Spacing<br>. For timber<br>. For pulpwood<br>. ... | D. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 6.<br>. Local foresters<br>. Clemson University Extension Service. Forest Tree Planting Guides. Information card #88.<br>. Film: Tree and Shrub Planting. 11 1/2 min.<br>. ..... |
| E. Sources of seedlings | E. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 6.<br>. Local foresters<br>. ..... |

UNIT: Establishment and Management of Forests

SUB-UNIT: Establishment and Management of New Plantations

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| F. Diagram or otherwise describe an appropriate means of storing pine tree seedlings prior to planting. | F. Observe demonstrations of and/or actually "heel-in" seedlings. (This practice may no longer be needed--some trees are specially wrapped to prevent drying for long periods of time if stored properly.)<br>. ..... |
| G. Plant a pine tree seedling using a planting bar.<br>1. List the sequential steps involved in planting a pine seedling using a planting bar.<br>2. Show by a cross-sectional drawing the tree root correctly inserted in a slot formed by the planting bar.<br>3. Show by a cross-sectional diagram the means by which the planting bar is used to firm the soil around the roots after the seedling is inserted.<br>4. ..... | G. Observe demonstrations of and/or plant pine tree seedlings using a planting bar.<br>. As a class project, contract to plant a given area for local farmer.<br>. Prepare and/or observe a drawing which depicts the proper method of planting seedlings, using a planting bar.<br>. ..... |
| H. Plant pine tree seedlings using a typical tree planting machine.<br>1. Diagram the working principle of a typical planting machine. | H. Observe demonstrations of and "ride" a tree planter to plant seedlings.<br>. Visit an establishment site and observe a tree planter in operation. |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Establishment and Management of New Plantations

| TOPICS | RESOURCES |
|---|---|
| F. Methods of holding seedlings for planting | F. Anderson and Smith. Forests and Forestry. pp. 131-132.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 6.<br>. Local foresters<br>. ..... |
| G. Planting by planting bar | G. Anderson and Smith. Forests and Forestry. pp. 136-137.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 6.<br>. Local foresters<br>. S.C. State Forestry Commission. Planting Guides.<br>. ..... |
| H. Planting by machine<br>. Working principle of the machine<br>. Operation of the machine<br>. ..... | H. Anderson and Smith. Forests and Forestry. pp. 137-139.<br>. Local foresters<br>. ..... |

UNIT: Establishment and Management of Forests
SUB-UNIT: Establishment and Management of New Plantations

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 2. Operate a typical planting machine.<br>3. ..... | . Prepare a drawing showing the working principle of a typical tree planter.<br>. Invite a local machinery dealer to demonstrate a tree planter.<br>. Obtain and file information about tree harvesters from manufacturers.<br>. ..... |
| II. Select and implement management practices to maximize economic growth for a given plantation.<br>A. Select and implement management practices to maximize economic growth of newly established plantation of pines.<br>1. Select and implement protection practices needed.<br>a. Select and implement fire protection practices needed.<br>. Recommend the size and location of fire lanes.<br>. Recommend method(s) of establishment.<br>. Prepare a fire lane.<br>. ..... | II-A. As a class project, visit young plantations and observe pest control and thinning operations.<br>. Interview a local forester to determine protection practices being used for a young plantation of trees in the local community.<br>. Observe hardwood control practices used in a very young plantation.<br>. As a class project, implement a hardwood control program for a small part of a new plantation.<br>. Obtain and file a reference on chemical control of hardwoods.<br>. Obtain and file a reference on insect and disease control in trees. |

**UNIT:** Establishment and Management of Forests

**SUB-UNIT:** Establishment and Management of New Plantations

| TOPICS | RESOURCES |
|---|---|
| II-A. Plantation management<br>. Protection practices<br>. Fire lanes<br>. Hardwood control<br>. Chemical<br>. Mechanical<br>. ....<br>. Insect and disease control<br>. Chemical<br>. Other | II-A. Anderson and Smith. Forests and Forestry. Chapter 12 and 13.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lessons 8 and 9.<br>. USDA. Insects and Diseases of Trees in the South.<br>. S. C. Commission of Forestry. Forest Insects and Diseases of South Carolina Trees. Bulletin 116.<br>. Local forest fire rangers<br>. Local foresters<br>. Film: The Tree Farm. 13 1/2 min.<br>. ..... |

UNIT: Establishment and Management of Forests
SUB-UNIT: Establishment and Management of New Plantations

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| b. Select and implement a hardwood program if needed.<br>· Determine if control is needed.<br>· Select proper control method.<br>· Obtain and interpret chemical application information.<br>· Operate a tractor-type sprayer.<br>· Calibrate a sprayer.<br>· .....<br>c. Select and implement an insect and disease control program.<br>d. ..... | · Observe fire protection practices used for young plantations in the local community.<br>· Observe demonstrations of fire lane plowing.<br>· Observe demonstrations of chemical spraying for hardwood control and insect and disease control.<br>· ..... |
| 2. Select and implement intermediate cutting practices needed for a given plantation.<br>a. Determine when a plantation needs thinning.<br>· List at least two methods used to determine need for thinning a given plantation.<br>· Take an increment baring to determine growth rate.<br>b. Select an appropriate method of thinning a given plantation.<br>· List at least four different methods of thinning.<br>· Compare and contrast at least four methods of thinning.<br>· ..... | 2. Invite a local forester to discuss management practices used on a young plantation in the local community.<br>· Observe demonstration of and/or thin a plot of young trees which need pruning.<br>· Observe demonstrations of methods of determining the need for pruning, e.g., increment baring to determine growth rate, ratio of tree top to height, etc.<br>· Observe demonstrations of and/or practice low, crown, selection, and mechanical thinning of a young plantation.<br>· ..... |
| III. ..... | III. ..... |

UNIT: Establishment and Management of Forest
SUB-UNIT: Establishment and Management of New Plantations

| TOPICS | RESOURCES |
|---|---|
| 2. Intermediate cutting practices<br>a. Determining need for thinning<br>b. Methods of thinning<br>. Low thinning<br>. Crown thinning<br>. Selection thinning<br>. Mechanical thinning<br>. .....<br>c. ..... | 2. Anderson and Smith. Forest and Forestry. Chapter 4.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 2.<br>. Local foresters<br>. ..... |
| III. ..... | III. ..... |

C

## RESOURCES

UNIT: Establishment and Management of Forests

SUB-UNIT: Establishment and Management of New Plantations

### BOOKS

Anderson, David A. and William A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S.C.: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

### FILMS AND FILM STRIPS

S. C. State Commission of Forestry. P.O. Box 287, Columbia, South Carolina. 29202.
- Tree and Shrub Planting, 11 1/2 min.
- The Tree Farm, 13 1/2 min.

### BULLETINS

S. C. State Forestry Commission and Clemson University Extension Foresters. Clemson University, Clemson, S. C.:
- Forest Tree Planting Guide. Information card # 88.
- Getting Open Land Ready for Planting Pines. Information card # 93.
- Forest Insects and Diseases of South Carolina Trees. Bulletin 116.

USDA. Washington, D. C., Forest Service, State and Private Forestry - Southeastern Area Forest Pest Management Group. Insects and Diseases of Trees in the South.

### TRANSPARENCIES

UNIT: Establishment and Management of Forests

SUB-UNIT: Managing Existing Forests

OBJECTIVE(S): The student will be able to:

I. Select and implement management practices needed for an existing forest to achieve maximum economic growth.

II. .....

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Management of Existing Forests

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. Select and implement management practices for an existing forest to achieve maximum economic growth.<br>A. Analyze a given forest to determine the reforestation needs .<br>1. Determine the density of the existing stand.<br>2. Identify the areas which should be artificially planted.<br>3. Select an appropiate method of reforesting a given area.<br>4. ..... | I.-A. As a class project,visit several existing forests and practice analyzing them in terms of improved cultural practices needed for maximizing economic growth .<br>. Invite a local forester to help the class analyze a forest to determine needed cultural practices.<br>. Analyze various forest areas in terms of stand density and quality.<br>. Observe reforestation practices used by local foresters for different situations, e.g., open areas infested with hardwoods, areas with desirable seed trees, swampy terrain, etc. |
| B. Analyze a given existing forest to determine the types of cutting needed for the maximum economic development of a given forest.<br>1. Determine the need for thinning a given forest stand.<br>a. Select the type of thinning operation to use for a given plot of trees.<br>b. Mark the trees in a given plot to be removed.<br>c. .....<br>2. Analyze a given existing forest area to determine the need for hardwood control in pre-sapling age pines. | B. Visit different forest areas to observe the need for cutting.<br>. Invite a local forester to illustrate thinning methods.<br>. Practice marking trees to be cut in a small forest area for thinning. Ask a local forester to evaluate your choice.<br>. Observe a forest plot which is being "cleaned". Observe the procedures used to remove or control hardwoods.<br>. Observe a demonstration of and/or "clean" a small forest plot. |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Management of Existing Forests

| TOPICS | RESOURCES |
|---|---|
| I. Management of existing forests<br>A. Reforestation<br>1. Need identification<br>2. Methods<br>· Wild seedlings<br>· Direct seeding<br>· Nursery seeding<br>· ..... | I-A. Anderson and Smith. Forests and Forestry. pp. 119-126.<br>· Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 6.<br>· Clemson University Extension Service. Getting Open Land Ready For Planting Pines. Information card # 97.<br>· Clemson University Extension Service. Forest Tree Planting Guide. Information card # 88.<br>· Local foresters<br>· ..... |
| B. Determining cuttings needed<br>1. Thinning<br>· Determining need<br>· Type thinning needed<br>· .....<br>2. "Cleaning" cuts (hardwood removal)<br>· Determining need<br>· Methods of control<br>· Fire<br>· Chemical<br>· Mechanical<br>· ..... | B. Anderson and Smith. Forests and Forestry. Chapter 5.<br>· Kirkley, et al. Basic Forestry For Vocational Students in South Carolina. Lesson 7.<br>· Clemson University Extension Service. Thinning Pines for Pulpwood. Circular 332.<br>· Clemson University Extension Service. Chemical Control of Low-Grade Hardwoods. Information Card #90.<br>· Local foresters<br>· ..... |

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 3. List at least four means of controlling hardwoods in pre-sapling age pines.<br>4. Analyze an existing forest area to determine the need for improvement cutting.<br>5. List at least four types of improvement cutting.<br>6. Analyze a given forest area to determine the need for harvest cutting in a given stand.<br>7. Select an appropriate means of harvest cutting a given stand to remove mature timber and establish reproduction.<br>8. ..... | . Observe a demonstration of and/or actual harvest cutting operation.<br>. Observe demonstration of and/or mark trees for harvest cutting.<br>. ..... |
| C. Given an existing forest area the student will be able to recommend the protection practices needed.<br>1. When given an insect control handbook, the student will be able to identify either the insect or damage caused by the insect and recommend appropriate control measures.<br>2. When given a disease control handbook, the student will be able to identify either the disease itself or damage caused by the disease and recommend appropriate control measures. | C. Obtain and file references which will help in the identification of forest insects and diseases.<br>. Obtain and file references which give control recommendations for insects and diseases.<br>. As a class project, gather specimen insects and diseases.<br>. As a class project, gather specimens of tree damage caused by the more common insects and diseases of forest trees.<br>. Observe demonstrations of and/or apply an insecticide or disease control chemical to a given tree or plot of trees. |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Management of Existing Forests

| TOPICS | RESOURCES |
|---|---|
| 3. Improvement cutting | |
| • Determining need | |
| • Types | |
| • Sanitation | |
| • Salvage | |
| • Pruning | |
| 4. Harvest cutting | |
| • Determining need | |
| • Types | |
| • Clear cutting | |
| • Seed tree cutting | |
| • Shelterwood cutting | |
| • Selection cutting | |
| • ..... | |
| C. Protection practices | C. Anderson and Smith. Forests and Forestry. Chapters XII and XIII. |
| 1. Insects | |
| • Identification | • Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lessons 8 and 9. |
| • Controls | |
| • ..... | • USDA. Insects and Diseases of Trees in the South. |
| 2. Diseases | • Clemson University Extension Service. Forest Insects and Diseases of South Carolina Trees. Bulletin 116. |
| • Identification | |
| • Controls | |
| • ..... | • Local foresters |
| 3. Fire | • Local county fire rangers |
| | • ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Management of Existing Forests

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 3. When given an existing forest, the student will be able to recommend appropriate fire control practice. | . Observe demonstrations of and/or plow a fire lane.<br>. Observe the location and spacing of fire lanes on a given tract. |
| 4. ..... | . ..... |
| II. ..... | II. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Management of Existing Forests

| TOPICS | RESOURCES |
|---|---|
| II. ..... | II. ..... |

# RESOURCES

UNIT: Establishment and Management of Forests

SUB-UNIT: Managing Existing Forests

## BOOKS

Anderson, David A. and William A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S.C.: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

## FILMS AND FILM STRIPS

Modern Talking Picture Service - Film Libraries. 412 West Peachtree Street N.W., Atlanta, Georgia 30308. To Touch The Sky.

## BULLETINS

S. C. State Forestry Commission and Clemson University Extension Foresters. Clemson University, Clemson, South Carolina:

Forest Tree Planting Guide - Information card # 88.

Getting Open Land Ready for Planting Pines - Information card # 93.

Forest Insects and Diseases of South Carolina Trees. Bulletin # 116.

Chemical Control of Low-Grade Hardwoods. Information card # 90.

USDA. Washington, D.C.: Forest Service, State and Private Forestry - Southeastern Area Forest Pest Management Group. Insects and Diseases of Trees in the South.

## TRANSPARENCIES

UNIT: Forest Ecology

OBJECTIVE(S): The student will be able to:

I. Identify the major interrelations which exist in a given forest environment.

II. Identify the major ecosystems which exist within a given environment.

III. Describe in writing and/or by diagram the ecological interrelationships between a given environment and a given type of wildlife.

IV. Recommend procedures for altering a given ecosystem to achieve a given goal.

V. Describe in writing and/or by diagram the sequence of forest succession from a given beginning.

VI. .....

**UNIT:** Forest Ecology
**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Analyze and describe by diagram and/or in writing a given forest in terms of its ecology. | |
| A. Identify the major interrelations within a given environment.<br>1. Identify and list the interrelationships of a given plant and its climate, soil and water, e.g. plants need soil for support, nutrients, etc. - soil are affected by plants because plants hold soil in place, affect temperature, water penetration, organic matter, etc.<br>2. Identify and list some of the interrelationships of plants, e.g., some trees are dependent upon others for shade, etc.<br>3. Describe the evolutionary sequence of a typical abandoned field.<br>4. .... | I - A. As a class or small group project, describe a small forest in terms of its ecology. The local biology, botany or science teachers may be able to offer assistance. Help from local foresters or wildlife persons might also be solicited.<br>. Observe and compare species of trees growing in different light conditions.<br>. Observe and compare species of trees growing in differing soil conditions.<br>. Observe and compare species of trees growing in areas of good and poor drainage.<br>. If possible visit several abandoned fields in various stages of evolution. |
| 7<br>B. .... | B. .... |
| II. Identify the major ecosystems which exist within a given forest environment.<br>A. Identify the major interrelationship within a given ecosystem.<br>B. Label the boundaries of a given ecosystem.<br>C. Identify the limiting factor(s) in a given ecosystem. | II. Observe demonstrations of and participate in the identification and labeling of major ecosystems within a forest plot. Again local biology or science teachers may be most helpful. Local foresters or wildlife persons will also be helpful.<br>. Locate the major ecosystems and habitats in the school nature trail, if one is available. |

**UNIT:** Forest Ecology
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| I. Forest ecology<br>A. Identification of Interrelationships<br>1. Trees and climate (light, temperature, moisture, $CO_2$)<br>2. Trees and soil<br>3. Trees and water<br>4. Trees and other trees<br>5. Trees and animals<br>6. ...<br>B. .... | I. Anderson and Smith. Forests and Forestry. Chapter IV, also pp. 11-14.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 18.<br>. Local biology, botany or science teachers<br>. Local forester or wildlife agent<br>. Film: Adventuring in Conservation, 14 min.<br>. Film: Beyond the Suburbs, 14 1/2 min.<br>. Film: Just Beyond the Chalkboard, 23 min.<br>. Film: Life in the Forest, 10 min.<br>. Film: Life in the Deciduous Forest, 19 min.<br>. Film: Living Forest Series<br>Part I The Forest Grows, 11 min.<br>Part II The Forest Produces, 11 min.<br>Part III Forest Conservation, 11 min.<br>. Film: Plant-Animal Communities: Ecological Succession, 13 1/2 min.<br>. S. C. Commission of Forestry. Investigating Your Environment. (A Lesson Plan for Investigating a Forest Environment.)<br>. .... |
| II. Identification of ecosystems<br>A. Identification of major interrelationships<br>B. Labeling boundaries<br>C. Identification of limiting factor(s) | II. Anderson and Smith. Forests and Forestry. Chapter IV.<br>. Kirkley, et al. Basic Forestry For Vocational Students in South Carolina. Lesson 18.<br>. McCormick. The Life of the Forest.<br>. Local science, biology and botany teachers |

**UNIT:** Forest Ecology

**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| D. .... | . Prepare picture boards of an ecosystem which has been identified and analyzed.<br>. .... |
| III. Describe the ecological interrelationship between a given environment and a given type of wild life.<br>A. List the habitat requirements for a given type of wildlife.<br>1. List the food requirements supplied by a forest for a given form(s) of wildlife.<br>2. List the shelter requirements supplied by a forest for a given form(s) of wildlife.<br>3. ....<br>B. Describe the life cycle of a given form(s) of wildlife.<br>C. List the major interrelationships between plants and animals in a given ecosystem.<br>D. List the major interrelationships between animals and other animals in a given ecosystem.<br>E. .... | III. As an individual or small group project, examine the habitat requirements of an animal such as the rabbit to determine the dependency upon the forest.<br>. Prepare a life cycle chart of an animal.<br>. .... |
| IV. Recommend procedures for altering a given ecosystem to achieve a given goal.<br>A. List the steps in establishing a given tree crop for achieving maximum growth rate.<br>1. Identify the controllable factors.<br>2. Recommend appropriate procedures for controlling limiting growth factors.<br>3. ... | IV. Compile a list of recommendations for the improvement of a given ecosystem.<br>. Select and do at least one project to improve an ecosystem, e.g., destroy competitor plants in a given ecosystem, or construct squirrel boxes in a given habitat. |

**UNIT:** Forest Ecology
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| D. .... | . Local foresters and wildlife agents<br>. Films: See those previously listed.<br>. S. C. Commission of Forestry. Investigating Your Environment (A Lesson Plan for Investigating a Forest Environment.) |
| III. Wildlife ecology<br>A. Habitat requirements<br>. Food<br>. Shelter<br>. ...<br>B. Interrelationships<br>. Animal to other animal<br>. Animal to plant<br>. ...<br>C. Life cycle of wildlife<br>D. ... | III. Andrews. A Guide to the Study of Freshwater Ecology.<br>. Local wildlife agent<br>. Local forester<br>. Local biology teacher<br>. McCormick. The Life of the Forest.<br>. S. C. Commission of Forestry. Investigating Your Environment Series: Lesson Plan Outline for Investigating Environmental Habitats. |
| IV. Altering the forest ecology<br>A. Identification of goals | IV. Anderson and Smith. Forests and Forestry. Chapters IV and V.<br>. Local foresters and wildlife agents<br>. .... |

**UNIT:** Forest Ecology
**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| B. Perform a site index of a given forest. | |
| C. .... | |
| V. Describe a typical evolution or succession of a forest from a given beginning. | V. Invite a local forester to assist the class in analyzing the evolution of a forest from an abandoned field. |
| A. List the sequence of a typical forest succession beginning with an abandoned field. | • Visit several abandoned fields in various stages of succession. (In many of the more sandy locations this succession will begin with broom straw.) |
| B. List the sequence of a typical forest succession beginning with a dried-up swamp. | • Visit a 20 year old forest which evolved from an abandoned field. (Note the relationship of hardwoods and pines). |
| C. .... | • If possible, find a mature forest which developed from an abandoned field and note its composition. |
| | • Prepare a poster depicting the succession of a local abandoned field. |
| | • .... |
| VI. .... | VI. .... |

**UNIT:** Forest Ecology
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| B. Identification of limiting factors | |
| C. Maximization of existing resources | |
| D. Elimination of competition | |
| E. Factors which affect plant growth<br>· Soil<br>· Temperature<br>· Light<br>· Day length<br>· Rainfall<br>· Forms of precipitation<br>· ... | |
| F. Site index | |
| G. ... | |
| V. Forest Succession | V. Spurr. Forest Ecology. Chapter 12. |
| A. Abandoned field | · Local foresters |
| B. Dry Swamp | · Local biology teacher |
| C. ... | · .... |
| VI. .... | VI. .... |

## RESOURCES

UNIT: Forest Ecology

SUB-UNIT:

### BOOKS

Anderson, David A. and William A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Andrews, William A. A Guide to the Study of Fresh Water Ecology. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1972.

Kirkley, Frank E. et al. Basic Forestry For Vocational Students in South Carolina. Clemson, SC. Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

McCormick, Jack. The Life of the Forest. New York, N.Y.: McGraw-Hill Book Company, 1966.

Spurr, Stephen H. Forest Ecology. New York, N.Y.: The Ronald Press Company, 1964.

### FILMS AND FILM STRIPS

South Carolina Commission of Forestry, P.O. Box 287, Columbia, S.C. 29202.

Adventuring in Conservation, 11 min.

Beyond the Suburbs, 14 1/2 min.

Just Beyond the Chalkboard, 23 min.

Life in the Forest, 10 min.

Life in the Deciduous Forest, 19 min.

Living Forest Series:
- Part I - The Forest Grows, 11 min.
- Part II - The Forest Produces, 11 min.
- Part III - Forest Conservation, 11 min.

Plant - Animal Communities: Ecological Succession.

### BULLETINS

Investigating Your Environment Series. U.S. Forest Service, Portland, Oregon. South Carolina Commission of Forestry, P.O. Box 287, Columbia, S.C. 29202. Investigating Your Environment Series - A Lesson Plan for Investigating A Forest Environment.

### TRANSPARENCIES

UNIT: Establishment and Management of Forests

SUB-UNIT: Tree Growth

OBJECTIVE(S): The student will be able to:

I. Describe the major processes of tree growth.

II. Diagram the structure of a typical tree and list the functions of each major part.

III. Diagram, label and list the functions of the major cell types found in: 1) a cross section of a leaf, 2) a cross section of a root, and 3) a cross section of a trunk.

IV. Diagram, label and list the functions of the major components of a cell.

V. .....

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Tree Growth

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Describe the major processes of tree growth. | I. Illustrate through experiments the major plant processes. (See references) |
| A. Describe in writing and/or by formula the process of photosynthesis which takes place in a growing tree. | . Demonstrate osmosis, diffusion and imbibition using a salt solution and a semi-permeable membrane. |
| B. Describe in writing and/or by formula the process of respiration which takes place in a growing tree. | . ...... |
| C. Describe in writing and/or by formula the process of assimilation which takes place in a growing tree. | |
| D. Describe in writing and/or by diagram the process of absorption. | |
| E. ..... | |
| II. Diagram the structure of a typical tree and list the function of each major part. | II. Observe diagrams of tree structure. |
| A. Diagram, label the parts and list the functions of the root system. | . Prepare diagrams of tree structure. |
| 1. Diagram and list the function of the top root. | . Prepare cross sectional mounts of tree trunks, limbs, flowers, roots, etc. |
| 2. Diagram and list the function of secondary roots. | . Prepare leaf prints. |
| 3. Diagram and list the functions of root hairs. | . ...... |
| 4. ...... | |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Tree Growth

| TOPICS | RESOURCES |
|---|---|
| I. Major growth processes<br>A. Photosynthesis<br>B. Respiration<br>C. Assimilation<br>D. Absorption (osmosis) (diffusion)<br>E. ..... | I. Anderson and Smith. Forests and Forestry. pp. 23-33.<br>. Kirkely, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 19.<br>. Wilson. The Growing Tree.<br>. Film: Time Lapse Study of Growing Trees, 10 min.<br>. Film: Seasonal Changes in Trees, 11 min.<br>. Film: The Forest Grows, 11 min.<br>. ..... |
| II. Tree structure<br>A. Roots<br>. Tap<br>. Lateral<br>. Fibrous<br>. Deep descending<br>. Root hairs | II. Anderson and Smith. Forests and Forestry. pp.23-28.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 19.<br>. Wilson. The Growing Tree.<br>. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Tree Growth

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| B. Diagram, label the parts and list the functions of the trunk. | |
| C. Diagram, label the parts and list the functions of the crown and leaves. | |
| D. Diagram, label the parts and list the functions of a typical tree flower. | |
| E. ..... | |
| III. Diagram, label and give the functions of the major cell types found in: 1) the cross section of a leaf, 2) the cross section of a root, and 3) the cross section of a trunk. | III. Observe diagrams of cellular structure.<br>. Obtain or prepare slide mounts of cell structure of leaves, roots, etc. |
| IV. Diagram, label and list the functions of the major parts of a typical cell. | IV. Observe diagrams of a typical cell.<br>. Obtain or prepare a slide mount of cell for observation under a microscope.<br>. ..... |
| V. ..... | V. ...... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Tree Growth

| TOPICS | RESOURCES |
|---|---|
| B. Trunk<br>. Outer bark<br>. Inner bark (phloem)<br>. Cambium layer<br>. Sapwood (xylem)<br>. Heartwood<br>. ..... | |
| C. Crown and leaves | |
| D. ..... | |
| III. Cellular structure of tree parts.<br>. Leaf cellular structure<br>. Root cellular structure<br>. Trunk cellular structure<br>. ..... | III. VEMC. Plant Science Transparencies.<br>. VEMC. Plant Science Manual. Miss. State.<br>. Local biology or science teacher<br>. ..... |
| IV. Cell structure<br>. Cell wall<br>. Chloroplast<br>. Plastids<br>. Vacuole<br>. Nucleus | IV. VEMC. Plant Science Manual. Miss. State.<br>. VEMC. Plant Science Transparencies.<br>. Local biology or science teacher<br>. ..... |
| V. ..... | V. ..... |

## RESOURCES

UNIT: Establishment and Management of Forests
SUB-UNIT: Tree Growth

### BOOKS

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Vocational Education Media Center in cooperation with The South Carolina Division of Vocational Education, 1974.

Wilson, B. F. The Growing Tree. Amherst, Mass.: The University of Massachusetts Press, 1970.

Mississippi State Board of Vocational Education. A Reference Unit on Basic Principles of Plant Science. College State, Mississippi.

### FILMS AND FILM STRIPS

South Carolina State Commission of Forestry. P.O. Box 287, Columbia, S. C. 29202. Time Lapse Study of the Growth of Trees, 10 min.; Seasonal Changes in Trees, 11 min.; The Forest Grows, 11 min.

### BULLETINS

### TRANSPARENCIES

Vocational Education Media Center, 109 Freeman Hall, Clemson University, Clemson, S.C. Plant Science Transparencies.

UNIT: Establishment and Management of Forests

SUB-UNIT: Forestry Production Economics

OBJECTIVE(S): The student will be able to:

I. When given the relevant variables, site index, price of forest products, interest rates, etc., estimate within 5% the annual profit yield of a given acre of a given tree crop.

II. Compare the average yearly profit from growing pines with that of growing other agricultural crops on a given acre of land with a given site index.

III. .....

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Forestry Production Economics

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. When given the relevant variables, site index price of forest products, establishment cost per acre, etc., determine the anticipated annual profit to be received from the establishment of a given tree crop.<br>A. Perform or obtain and interpret a site index report made from the soil and/or similar forest tree growth and field.<br>B. When given the annual interest rate and total investment per acre, calculate the annual interest cost on an acre of land.<br>C. Obtain and/or estimate the costs involved in establishing a given acre of trees.<br>D. Estimate within one cord the number of cords of pulpwood thinned from a well managed acre of loblolly pine at the 15th, 20th and 25th years.<br>E. Estimate within one mbf the amount of timber which can be harvested from a typical well managed loblolly forest at the following ages: 30, 35, 40, 45, 50, 55, 60.<br>F. .... | I. Invite a local pulpwood or timber company forester to visit the class and discuss the economics of planting trees as a crop.<br>. Observe a demonstration of site indexing.<br>. Obtain current prices of forest products - especially pulpwood and saw timber.<br>. Prepare an anticipated cost sheet for establishing a typical acre of pines.<br>. Obtain establishment cost estimates from local commercial foresters.<br>. Obtain yield figures for a given acre of forest and/or cruise a given age forest to determine yield of pulpwood and saw timber.<br>..... |
| II. Compare and contrast the average yearly profits from growing pines with that of growing other agricultural crops on a given acre of land with a given site index. | II. Obtain yearly cost and return data from other crops such as cotton or corn and compare profits with that of forest crops. |
| III. ..... | .....<br>III. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Forestry Production Economics

| TOPICS | RESOURCES |
|---|---|
| I. Profit determination<br>A. Determining yield potential of a site<br>B. Interest on land cost<br>C. Establishment costs<br>. Seedlings<br>. Site preparation<br>. Planting<br>. .....<br>D. Pulpwood yield<br>E. Saw timber yield<br>F. ..... | I. Kirkley. Basic Forestry for Vocational Students in South Carolina, Lesson 7.<br>. Local foresters<br>. ..... |
| II. Comparing tree crop profits with that of other agricultural crops<br>. Trees vs corn<br>. Trees vs cotton | II. Kirkley. Basic Forestry for Vocational Students in South Carolina. Lesson 7.<br>. ..... |
| III. ..... | III. ..... |

## RESOURCES

UNIT: Establishment and Management of Forests
SUB-UNIT: Forestry Production Economics

| | |
|---|---|
| BOOKS<br>Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S.C.: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974. | FILMS AND FILM STRIPS |
| BULLETINS | TRANSPARENCIES |

UNIT: Establishment and Management of Forests

SUB-UNIT: Pest Control

OBJECTIVE(S): The student will be able to:

I. Plan an insect control program for a given forest.
II. Plan a disease control program for a given forest.
III. Plan a hardwood control program for a given forest.
IV. .....

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Pest Control

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. Plan a pest control program for a given forest.<br>A. Plan an insect control program for a given forest.<br>1. Identify at least ten of the more common insects which seriously damage trees.<br>a. When shown damage done, identify the insect which caused the injury.<br>b. Give the life cycle of a given insect.<br>c. .....<br>2. With the aid of an appropriate reference, select an effective method(s) of prevention, control or eradication of a given insect.<br>3. Select a recommended means of applying a given treatment.<br>4. List at least one source of insect control information.<br>5. ..... | I. As a class project,plan a pest control program for a small forest in the community.<br>. As a class project,inspect a forest area to determine insect damage.<br>. Ask a local forester to help locate forest insect damage in the local community.<br>. Obtain specimen insects and/or pictures of such insects and the damage caused by them.<br>. Obtain and file at least one reference which gives pictures (preferably color) of the major forest insects.<br>. Obtain and file a reference which gives recommended preventative control or eradication methods.<br>. Prepare a life cycle chart of the more common forest insects.<br>. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Pest Control

| TOPICS | RESOURCES |
|---|---|
| I. Pest Control<br>A. Insect control<br>• Identification<br>• Identification by insect<br>• Bark beetles<br>• Ips engraver beetles<br>• Southern pine beetles<br>• Black turpentine beetles<br>• Leaf eaters<br>• Wood borers<br>• Tip feeders<br>• Gall formers<br>• Identification by damage<br>• Recommended controls<br>• Preventive<br>• Eradication<br>• .....<br>• Means of applying control<br>• Removal of infested trees<br>• Aerial application<br>• ..... | I. Anderson and Smith. Forests and Forestry. Chapter XIII.<br>• Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 8.<br>• USDA. Insects and Diseases of Trees in the South.<br>• Clemson University Extension Service. Forest Insects and Diseases of South Carolina Trees. Bulletin 116.<br>• Local foresters or forest entomologist<br>• Film: Pamela's Tree.<br>• ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Pest Control

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. Plan a disease control program for a given forest.<br>A. Identify at least ten of the more common diseases which seriously damage trees.<br>B. With the aid of an appropriate reference, select an effective method(s) of prevention, control or eradication of a given disease.<br>C. Select a recommended means of applying a given treatment.<br>1. Compare and contrast sprays vs. dust.<br>2. .....<br>D. List at least one source of disease control information.<br>E. ..... | II. As a class project, survey a small forest area to determine disease damage.<br>. Ask a local forester to help locate disease damage in local forest.<br>. Obtain specimens or pictures of the major forest diseases and/or the damage caused by them.<br>. Obtain and file at least one reference which gives recommended control, preventive or eradication measures.<br>. ..... |

UNIT: Establishment and Management of Forests
SUB-UNIT: Pest Control

| TOPICS | RESOURCES |
|---|---|
| II. Disease control<br>A. Identification<br>. Disease itself<br>. Effects of disease<br>. .....<br>B. Diseases<br>. Annosus root rot<br>. Wood rots<br>. Gall rusts<br>. Brown spot needle blight<br>. Dutch elm disease<br>. Oak wilt<br>. .....<br>C. Recommended controls<br>. Preventive<br>. Eradication<br>. .....<br>D. Means of applying controls<br>. Aerial application<br>. Removal of infested trees<br>E. ..... | II. Anderson and Smith. Forests and Forestry. Chapter XIII.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 8.<br>. USDA. Insects and Diseases of Trees in the South.<br>. Clemson University Extension Service. Forest Insects and Diseases of South Carolina Trees. Bulletin 116.<br>. Local foresters or forest entomologist<br>. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Pest Control

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| III. Plan a hardwood control program for a given forest. | |
| A. Given a plot of forest, determine the need for hardwood control.<br>1. List the effects of hardwood on the growth of the preferred species in a given stand.<br>2. ..... | III-A. As a class project, visit several forest sites to evaluate the need for hardwood control.<br>. Compare the growth rate of young seedlings surrounded by hardwoods compared to those without such competition.<br>. Observe the growth of young pines under large hardwoods.<br>. ..... |
| B. Identify the species of hardwood trees within a given stand which should be removed to maximize growth of the preferred species.<br>1. List at least five species of hardwoods which often infest pine tree seedling stands.<br>2. List at least five species of hardwoods which are often found to prevent reforestation of pines. | B. Observe the most common species of hardwoods which infest pines.<br>. ..... |
| C. Given a situation, e.g., pine seedling growing, under low growing, low grade oaks of various sizes, recommend a treatment. | C. Observe treatments being used to control hardwoods on various sites in the local area.<br>. ..... |
| D. List at least four methods of controlling weed trees.<br>1. List at least two mechanical means of control.<br>2. List at least two means of chemical control. | D. Observe demonstrations of and/or perform various hardwood control methods.<br>. Observe demonstrations of and/or practice girdling large hardwoods with an axe.<br>. Observe demonstrations of and/or practice frilling trees in preparation for the addition of chemicals. |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Pest Control

| TOPICS | RESOURCES |
|---|---|
| III. Hardwood control<br>A. Determining need for control | III. Anderson and Smith. *Forests and Forestry*. pp. 106-110.<br>. Kirkley, *et al*. *Basic Forestry for Vocational Students in South Carolina*. Lesson 12.<br>. Clemson University Extension Service. *Controlling Upland Hardwoods in South Carolina*. Circular 385.<br>. Local foresters<br>. ..... |
| B. Identification of undesirable hardwoods | B. S. C. Commission of Forestry and Clemson Extension Service. *Familiar Trees in South Carolina*.<br>. Local foresters<br>. ..... |
| C. Treatment selection<br>D. Methods of treatment<br>1. Mechanical<br>. Axe girdling<br>. Sawing<br>. Bulldozing<br>. Mowing<br>. .....<br>2. Chemical<br>. Trunk application<br>. Base application<br>. Stump application | C-D. Kirkley, *et al*. *Basic Forestry for Vocational Students in South Carolina*. Lesson 12.<br>. Clemson University Extension Service. *Chemical Control of Low-Grade Hardwoods*. Information card # 90.<br>. Clemson University Extension Service. *Controlling Upland Hardwoods in South Carolina*. Circular 385.<br>. Local foresters |

**UNIT:** Establishment and Management of Forests

**SUB-UNIT:** Pest Control

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 3. Prepare a tree for chemical treatment using the frill method. | . Observe demonstrations of and/or practice notching hardwoods. |
| 4. Girdle a tree according to recommended procedures. | . Observe demonstrations of and/or apply chemical controls to a stump to prevent sprouting. |
| 5. ..... | |
| E. Given a hardwood species, its size, surrounding vegetation, time of year, etc., select an appropriate method of kill. | E. Ask a local forester to discuss recommended treatments for various sites.<br>. Obtain and file a reference which gives recommended controls.<br>. ..... |
| F. Given a hardwood species, its size, surrounding vegetation, time of year, etc., select with the aid of an appropriate reference, an appropriate chemical for control. | F. Obtain and file a reference which gives recommended chemical controls.<br>. ..... |
| G. List at least one reference which gives recommended chemical controls. | G. Same as above. |
| H. List at least four safety hazards involved in the use of a given chemical for controlling hardwoods. | H. Prepare a poster board containing safety labels.<br>. Observe safety demonstrations of the handling of such chemicals. |
| I. ..... | I. ..... |
| IV. ..... | IV. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Pest Control

| TOPICS | RESOURCES |
|---|---|
| . Foliage application | |
| . ..... | |
| 3. Fire | |
| 4. ..... | |
| E. Method selection for a given situation | E.-I. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 12.<br>. Clemson University Extension Service. Chemical Control of Low Grade Hardwoods in South Carolina. Information Card # 90.<br>. Clemson University Extension Service. Controlling Upland Hardwoods in South Carolina. Circular 385.<br>. Local foresters<br>. Film: Control of Low Grade Hardwoods, 11 min.<br>. ..... |
| F. Chemical selection | |
| G. References | |
| H. Safety hazards | |
| I. ..... | |
| IV. ..... | IV. ..... |

## RESOURCES

UNIT: Establishment and Management of Forests

SUB-UNIT: Pest Control

### BOOKS

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S.C.: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

### FILMS AND FILM STRIPS

South Carolina State Commission of Forestry. P. O. Box 287, Columbia, S. C. 29202

Pamela's Tree, 13 1/2 min.

Control of Low Grade Hardwoods, 11 min.

### BULLETINS

Clemson University Extension Service in cooperation with the South Carolina State Commission of Forestry. Clemson University, Clemson, S. C. Forest Insects and Diseases of South Carolina Trees. Bulletin 116. Chemical Control of Low Grade Hardwoods in South Carolina. Information card # 90.

Clemson University in cooperation with the USDA. Clemson University, Clemson, S. C. Controlling Upland Hardwoods in South Carolina. Circular 385.

USDA. Forest Service, State and Private Forestry. Southeastern Area Forest Pest Management Group. Insects and Diseases of Trees in the South.

### TRANSPARENCIES

UNIT: Establishment and Management of Forests

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in the establishment and management of forests with those in other areas of forestry.

II. List the ways in which a given career in the establishment and management of forests might complement or fail to complement life goals.

III. ....

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Exploring Careers

## OBJECTIVES

The student will be able to:

I. Compare and contrast career opportunities in the establishment and management of forests with those in other areas of forestry.

   A. List the major job titles related to establishing and managing forests.

   B. Classify the careers as to occupational level, i.e., professional, technical, service, etc.

   C. List the major competencies needed for a career in establishing and managing forests.

   D. List the major activities performed by persons employed in establishing and managing forests.

   E. List the educational requirement for persons employed in this area and sources of such training.

   F. .....

## LEARNING ACTIVITIES

I. Interview as many people employed in establishing and managing forests as is feasible.

- Prepare a detailed report of the job(s) of particular interest.
- Arrange to spend a day or portion of a day with a person employed in establishing and managing forests.
- Seek occupational work experience as an aide to a person employed in establishing and managing forests.
- Investigate with your teacher of agriculture and/or guidance counselor the possibilities for further training and job opportunities in the area.
- Practice as many of the tasks performed by people employed in this area as is feasible.
- .....

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| I. Careers in establishing and managing forests<br>A. Career titles<br>1. Forest manager<br>2. .....<br>B. Career classification<br>1. Professional<br>2. Technical<br>3. Service<br>4. .....<br>C. Competencies needed<br>1. Knowledge<br>2. Skills<br>3. Attitude<br>4. .....<br>D. Major activites<br>E. Educational requirements<br>F. ..... | I. Anderson and Smith. *Forests and Forestry*. Chapter I.<br>• Kirkley, *et al*. *Basic Forestry for Vocational Students in South Carolina*. Lesson 1.<br>• Hoover. *Handbook of Agricultural Occupations*. Chapter XIII.<br>• Local foresters<br>• Film: *The American Forester*, 14 1/2 min.<br>• ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. List the ways in which a given career in establishing and managing forests might complement or fail to complement life goals.<br>A. List at least five ways in which a career in establishing and managing forests might benefit society.<br>B. List at least five ways in which a career in establishing and managing forests might benefit an individual.<br>C. ..... | II. Prepare a short paper concerning the ways in which a career in establishing and managing forests might complement or fail to complement life goals.<br>• Participate in a class debate of life goals.<br>• Investigate the living conditions and life style of a person employed in establishing and managing forests.<br>• ...... |
| III. ..... | III. ..... |

**UNIT:** Establishment and Management of Forests
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| II. Career Exploration<br>A. Life goals<br>B. Benefits to society<br>C. ... | II. Hoover. Handbook of Agricultural Occupations. Chapter I.<br>. Local school guidance counselor<br>. Local foresters<br>. ... |
| III. .... | III. .... |

## RESOURCES

UNIT: Establishment and Management of Forests

SUB-UNIT: Exploring Careers

### BOOKS

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, SC: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

### FILMS AND FILM STRIPS

S. C. Commission of Forestry. P. O. Box 287, Columbia, South Carolina.

The American Forester. 14 1/2 min.

### BULLETINS

### TRANSPARENCIES

UNIT: Forest Fire Control

OBJECTIVE(S): The student will be able to:

I. Plan a forest fire control program for a given community.

  A. Plan a public awareness program for a given community.

  B. Plan a fire protection program for a given forest area.

  C. Select the most appropriate method(s) of suppressing or controlling a given forest fire.

  D. ....

II. ....

**UNIT:** Forest Fire Control
**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. Plan a forest fire control program for a given community.<br>A. Plan a public awareness program for a given community.<br>1. List at least five methods of making the public aware of the need for fire prevention.<br>2. List at least five types of damages caused by forest fires.<br>3. List five major causes of forest fires.<br>4. .... | I.-A. Invite a local forest fire ranger to discuss measures being taken in the local area to inform people about the importance of forest fire control.<br>. Prepare posters emphasizing means of preventing forest fires.<br>. Prepare posters showing the extent of damage caused by forest fires.<br>. Observe films and arrange to show films on fire prevention to local civic groups.<br>. Visit burned and unburned stands of trees to compare growth rate.<br>. As a BOAC project, plan a radio program on forest fire prevention.<br>. .... |
| B. Plan a fire prevention program for a given forest area.<br>1. Plan a fire lane construction program for a given forest.<br>a. Recommend the width, depth, and spacing of fire lanes needed for a given forest area.<br>b. Recommend the width and location of border strip burns needed for a given forest.<br>c. .... | B - 1. While on a field trip to a forest note the location, width and depth of fire lanes.<br>. Ask a local forest fire ranger to demonstrate fire lane plowing and to discuss width, depth and spacing.<br>. .... |

UNIT: Forest Fire Control
SUB-UNIT:

| TOPICS | RESOURCES |
|---|---|
| I. Forest fire control<br>A. Public awareness<br>1. Methods<br>2. Importance<br>3. Causes<br>4. ... | I-A. Anderson and Smith. *Forests and Forestry*. Chapter XII.<br>. Kirkley, *et al*. *Basic Forestry for Vocational Students in South Carolina*. Lesson 9.<br>. Local forest fire ranger<br>. Local extension forester<br>. Film: *The Burning Issue*, 14 min.<br>. Film: *The Careless Crime*, 14 1/2 min.<br>. Film: *Caught in the Act*, 14 1/2 min.<br>. Film: *Dead Out*, 20 min.<br>. Film: *Frying Pan and the Fire*, 20 min.<br>. Film: *Lay it on the Line*, 22 min.<br>. Film: *Never the Easy Way*, 13 1/2 min.<br>. Film: *Smokey's Story*, 12 min.<br>. Film: *Talent for Disaster*, 19 min.<br>. Film: *Time's Running Out*, 20 min. |
| B. Forest fire prevention<br>1. Fire lane construction<br>. Specifications<br>. Locations<br>. Methods<br>. ... | B. Anderson and Smith. *Forests and Forestry*. Chapter XII.<br>. Kirkley, *et al*. *Basic Forestry for Vocational Students in South Carolina*. Lesson 9.<br>. Local forest fire ranger<br>. Local fire towerman<br>. Film: *Man Against Fire*, 28 min.<br>. .... |

UNIT: Forest Fire Control
SUB-UNIT:

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 2. Plan a forest fire reporting program for a given community. | 2. Visit a local fire tower and practice locating fires using an azimuth map. |
| a. Determine the number and location of fire towers needed for a given community. | . Obtain and use the variables used in preparing a burn index for a given day. |
| b. Locate a fire using an azimuth map. | . .... |
| c. Interpret and/or prepare a burn index for a given area at a given time. | |
| d. .... | |
| C. Select the most appropriate method(s) of suppressing or controlling a given forest fire. | C. Individually or in small groups attend a forest fire with a local forest fire ranger to observe the strategy and techniques used in suppression. Participate in as many activities as possible. |
| 1. Differentiate between ground, surface and crown fires. | . Observe demonstrations of and/or use the knapsack water gun to suppress fire. |
| 2. List at least five factors which affect the rate of movement and intensity of a wild fire. | . Observe demonstrations of and use the fire flap for suppressing fire. |
| 3. List the three major means of fire suppression. | . Observe demonstrations of and help set a backfire. |
| 4. List at least two means of depriving a wildfire of its fuel. | . Observe fire safety demonstrations. |
| 5. List at least two means of depriving a wildfire of its oxygen. | . Practice, through simulation maps and given conditions, the selection of appropriate suppression methods. |
| 6. List at least two means of lowering the temperature of a wildfire. | . Obtain a topographical map of a local forest area and assume a fire in a given spot traveling a given direction at a given speed with a given wind, etc. Select the location of backfires, etc. |
| 7. Given a fast burning surface fire, select the most appropriate means of suppression (direct or indirect). | . .... |
| 8. Demonstrate the ability to operate a knapsack sprayer in an effective manner. | |

**UNIT:** Forest Fire Control
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| 2. Fire reporting<br>· Tower location<br>· Use of azimuth maps<br>· Preparation of burn index<br>· ... | |
| C. Fire Suppression<br>1. Types of fires<br>· Ground<br>· Surface<br>· Crown<br>· ...<br>2. Intensity<br>3. Means of Suppression<br>· Fuel deprivation<br>· Lower temperature<br>· Oxygen deprivation<br>· ...<br>4. Techniques<br>· Direct<br>· Indirect (backfire)<br>· ...<br>5. Equipment needs<br>· Tractor & plows<br>· Sprayers<br>· Flaps<br>· Fire bombers | C. Anderson and Smith. Forests and Forestry. Chapter XII.<br>· Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 9.<br>· Local forest fire ranger<br>· Local foresters<br>· Film: Forest Fire Fighting in the South, 39 min.<br>· Film: Suppression Burning, 20 min.<br>· Film: What it Takes, 13 1/2 min. |

UNIT: Forest Fire Control
SUB-UNIT:

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 9. Select the type of equipment needed for suppressing a given fire. | |
| a. Select the type tractor and plow needed for a given terrain. | |
| b. Select the type of knapsack sprayer needed. | |
| c. .... | |
| 10. Determine the need for "water banking". | |
| 11. .... | |
| D. .... | D. .... |
| II. ...... | II. ...... |

**UNIT:** Forest Fire Control
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| D. .... | D. .... |
| II. .... | II. .... |

## RESOURCES

UNIT: Forest Fire Control

SUB-UNIT:

BOOKS

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley, Frank E., et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

FILMS and FILM STRIPS

South Carolina State Commission of Forestry
P. O. Box 287, Columbia, S. C. 29202.

The Burning Issue, 14 min.
The Careless Crime, 14 1/2 min.
Caught in the Act, 14 1/2 min.
Dead Out, 20 min.
Frying Pan and the Fire, 20 min.
Lay it on the Line, 22 min.
Never the Easy Way, 13 1/2 min.
Smokey's Story, 12 min.
Talent for Disaster, 19 min.
Times Running Out, 20 min.
Man Against Fire, 28 min.
Forest Fire Fighting in the South, 30 min.
Suppression Burning, 20 min.
What it Takes, 13 1/2 min.

BULLETINS

TRANSPARENCIES

UNIT: Forest Fire Control

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in forest fire control with those in other areas of forestry.

II. List the ways in which a given career in forest fire control might complement or fail to complement life goals.

III. .....

**UNIT:** Forest Fire Control
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Compare and contrast career opportunities in forest fire control with those in other areas of forestry.<br>A. List the major job titles related to forest fire control.<br>B. Classify the careers as to occupational level, i.e., professional, technical, service, etc.<br>C. List the major competencies needed for a career in forest fire control.<br>D. List the major activities performed by persons employed in forest fire control.<br>E. List the educational requirement for persons employed in this area and sources of such training.<br>F. ..... | I. Interview as many people employed in forest fire control as is feasible.<br>. Prepare a detailed report of the job(s) of particular interest.<br>. Arrange to spend a day or portion of a day with a person employed in forest fire control.<br>. Seek occupational work experience as an aide to a person employed in forest fire control.<br>. Investigate with your teacher of agriculture and/or guidance counselor the possibilities for further training and job opportunities in the area.<br>. Practice as many of the tasks performed by people employed in this area as is feasible.<br>. ..... |

**UNIT:** Forest Fire Control
**SUB-UNIT:** Exploring Careers

## TOPICS

I. Careers in forest fire control.

- A. Career titles
    1. District forester fire rangers
    2. County forester fire rangers
    3. Local fire wardens
    4. Towermen
    5. Tractor operators
    6. Fire fighters
    7. .....
- B. Career classification
    1. Professional
    2. Technical
    3. Service
    4. .....
- C. Competencies needed
    1. Knowledge
    2. Skills
    3. Attitude
    4. .....
- D. Major activities
- E. Educational requirements
- F. .....

## RESOURCES

I. Anderson and Smith. Forests and Forestry. Chapter 1.

- Hanaburgh. Your Future in Forestry.
- Kirkley, *et al*. Basic Forestry for Vocational Students in South Carolina. Lesson 1.
- Hoover. Handbook of Agricultural Occupations. Chapter XIII.
- Local foresters
- Film: The American Forester, 14 1/2 min.
- Film: The Man in Green, 28 min.
- .....

**UNIT:** Forest Fire Control
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. List the ways in which a given career in forest fire control might complement or fail to complement life goals. | II. Prepare a short paper concerning the ways in which a career in forest fire control might complement or fail to complement life goals. |
| A. List at least five ways in which a career in forest fire control might benefit society. | . Participate in a class debate of life goals. |
| B. List at least five ways in which a career in forest fire control might benefit an individual. | . Investigate the living conditions and life style of a person employed in forest fire control. |
| C. ..... | . ..... |
| III. ..... | III. ..... |

**UNIT:** Forest Fire Control
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| II. Career Exploration<br>A. Life goals<br>B. Benefits to society<br>C. ..... | II. Hanaburgh. Your Future in Forestry. Chapter IV.<br>. Hoover. Handbook of Agricultural Occupations. Chapter I.<br>. Local school guidance counselor<br>. Local foresters<br>. ..... |
| III. ..... | III. ..... |

## RESOURCES

UNIT: Forest Fire Control

SUB-UNIT: Exploring Careers

### BOOKS

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, SC: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

Hanaburgh, David H. Your Future in Forestry. New York, NY: Arco Publishing Company, Inc., 1971.

Hoover, Norman K. Handbook of Agricultural Occupations.

### FILMS AND FILM STRIPS

S. C. Commission of Forestry. P. O. Box 287, Columbia, S. C. The American Forester, 14 1/2 min; Man in Green, 28 min.

### BULLETINS

### TRANSPARENCIES

UNIT: Forest Recreation

SUB-UNIT: Planning an Outdoor Recreational Program

OBJECTIVE(S): The student will be able to:

I. Prepare an elementary plan for improving the local outdoor recreational program.

II. ....

**UNIT:** Forest Recreation
**SUB-UNIT:** Planning an Outdoor Recreational Program

## OBJECTIVES

The student will be able to:

I-A. Appraise the comprehensiveness and quality of the outdoor recreational programs of a given community.

1. List evaluative criteria for assessing the comprehensiveness and quality of an ORP for a given community.
2. List the major types of outdoor recreational programs available.
3. Develop a survey designed to determine the need for recreation.
    a. List agencies which provide such surveys.
    b. Obtain and interpret the results of a survey conducted by a local agency.
    c. .....

## LEARNING ACTIVITIES

I-A. Interview ORP leaders in the local community to determine ongoing programs and adequacy of such programs.

- As a class project, develop a standard recreational survey for your area. Have a local ORP leader evaluate your survey.
- Prepare a checklist for an evaluation program such as fishing, boating, hunting, swimming, picnicking, etc.
- Locate sources of information concerning ORP and file information obtained from such sources.
- ......

**UNIT:** Forest Recreation
**SUB-UNIT:** Planning an Outdoor Recreational Program

| TOPICS | RESOURCES |
|---|---|
| I-A. Outdoor recreational program evaluation<br>1. Criteria for evaluation<br>a. Who is being served?<br>b. How many are being served?<br>c. .....<br>2. Types of programs available<br>. Parks<br>. Games<br>. Golf<br>. Baseball<br>. Swimming<br>. Fishing<br>. Hunting<br>. Camping<br>. .....<br>3. Determining demand for outdoor recreational programs<br>4. Agencies involved<br>5. ..... | I-A. Local ORP persons<br>. Recreational foresters<br>. Smith, _et al_. _Rural Recreation for Profit_. Chapter 1.<br>. USDA. _A Place to Live, the Yearbook of Agriculture_. 1963. pp. 299-322.<br>. Department of Interior. _Community Action Program for Outdoor Recreation_.<br>. ..... |

**UNIT:** Forest Recreation

**SUB-UNIT:** Planning an Outdoor Recreational Program

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| B. Plan an ORP which meets the needs of a given community. | B. Draw up recommendations for improving comprehensiveness and quality of local ORP. |
| 1. Select and obtain information needed for planning.<br>a. Determine the ORP needs for a specific program in a given community.<br>1. Construct a survey to determine needs.<br>2. List the natural resources, facilities and personnel available or needed.<br>3. .....<br>b. List local agencies which plan ORPS.<br>c. List sources of information useful in planning ORPS.<br>d. ..... | 1. Interview local ORP leaders to determine information about local outdoor recreational programs.<br>. As a class project, survey the ORP needs of the local community.<br>. Visit some of the local ORPS.<br>. Debate the adequacy of local outdoor recreational programs.<br>. ..... |
| 2. Make recommendations for improving the comprehensiveness and quality of the ORP of a given community. | 2. Elect a classroom committee to prepare a list of recommendations for improvement.<br>. Ask a local ORP person to submit a list of recommendations for improvement.<br>. ..... |

**UNIT:** Forest Recreation
**SUB-UNIT:** Planning an Outdoor Recreational Program

**TOPICS**

B. Planning an outdoor recreation program

1. Surveying demand

   a. Family activities

   - Picnicking
   - Boating
   - Camping
   - .....

   b. Outdoor sports

   - Golf
   - Baseball
   - .....

   c. Wildlife activities

   - Hunting
   - Fishing
   - .....

   d. .....

2. Determining recreational areas and facilities required

   a. Selecting locations

   b. Selecting facilities and equipment

   c. .....

3. Recommendations

**RESOURCES**

B. Local outdoor recreation leaders

- Smith, et al. Rural Recreation for Profit.
- USDA. Outdoors USA, the Yearbook of Agriculture. 1967. pp. 6-100. Also selections from the section entitled "The Countryside."
- Department of Interior. Community Action Program for Outdoor Recreation.
- .....

UNIT: Forest Recreation

SUB-UNIT: Planning an Outdoor Recreational Program

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| C. Given a topographical map of the area, prepare an elementary forest park plan (diagram) which gives the location of such areas and facilities as camp sites, picnic areas, game areas, swimming areas, nature trails, concession stands, restrooms, roads, etc.<br>1. List the major factors to be considered in locating roads.<br>2. List the major factors to be considered in locating the swimming area.<br>3. List the major factors to be considered in locating the camping area.<br>4. List the major factors to be considered in locating the picnic area.<br>5. List the major factors to be considered in locating the games area.<br>6. ..... | C. As a class project, prepare an elementary forest park plan showing the location of the major areas and facilities.<br>. Visit a local forest park and observe and/or diagram the location of the major recreational areas and facilities.<br>. Plan a weekend camping trip to a local forest park to study recreational areas and facilities.<br>. ..... |
| D. Plan and conduct an overnight camping trip.<br>1. Select the equipment needed.<br>2. Select the type shelter needed.<br>3. Select the type and amount of food needed.<br>4. ..... | D. Take an overnight camping trip.<br>. Observe demonstrations of and/or set up tents.<br>. Observe demonstrations of and/or prepare meals.<br>. ..... |

**UNIT:** Forest Recreation

**SUB-UNIT:** Planning an Outdoor Recreational Program

| TOPICS | RESOURCES |
|---|---|
| C. Park planning | C. Local park superintendents |
| 1. Locating swimming area | . Local forest recreationalist |
| 2. Locating camping area | . Rutledge. Anatomy of a Park. |
| 3. Locating picnic areas | |
| 4. Locating game areas | |
| 5. Locating nature trails | |
| 6. Locating roads | |
| 7. Locating facilities | |
| 8. ..... | |
| D. Planning an overnight camping trip | D. Merrill. The Hikers and Backpackers Handbook. |
| 1. Equipment selection | . USDA. Outdoors USA, the Yearbook of Agriculture. 1967. |
| 2. Shelter selection | . Boy Scouts of America. Official Boy Scout Manual. |
| 3. Food supplies | . Film. Tent Flaps and Flapjacks, 25 min. |
| 4. ..... | |

**UNIT:** Forest Recreation

**SUB-UNIT:** Planning an Outdoor Recreational Program

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| E. Plan and conduct a field day for a group of cub scouts. | E. As a class project, plan and conduct a field day for a group of cub scouts. |
| 1. Select appropriate games. | . As a class project, hold a dry run of the major events of a typical field day program. |
| 2. Select appropriate facilities for a given game. | . ..... |
| 3. List the basic rules of a given game. | |
| 4. ..... | |
| F. ..... | F. ..... |
| II. ..... | II. ..... |

**UNIT:** Forest Recreation
**SUB-UNIT:** Planning an Outdoor Recreational Program

| TOPICS | RESOURCES |
|---|---|
| E. Planning a field day | E. High school coach |
| 1. Selecting appropriate games | . Donnelly, *et al*. *Active Games and Contests*. |
| 2. Selecting appropriate equipment | . ..... |
| 3. Scheduling | |
| 4. Scoring | |
| 5. Providing food, water and other supplies | |
| F. .... | F. .... |
| II. ..... | II. ..... |

## RESOURCES

UNIT: Forest Recreation

SUB-UNIT: Planning an Outdoor Recreational Program

### BOOKS

Boy Scouts of America. Official Boy Scout Manual.

Donnelly, Joseph D., William G. Helms and Elmer D. Mitchell. Active Games and Contests. New York: The Ronald Press Company, 1958.

Merrill, Bill. The Hikers and Backpackers Handbook. New York: Winchester Press, 1971.

Rutledge, Albert F. Anatomy of a Park. New York: McGraw-Hill, 1971.

U. S. Department of Agriculture. Outdoors USA, the Yearbook of Agriculture, 1967. Washington, D. C.: U. S. Government Printing Office.

U. S. Department of Interior. Community Action Program for Outdoor Recreation. Washington, D. C.: Superintendent of Documents.

### BULLETINS

### FILMS AND FILM STRIPS

USDA. Tent Flaps and Flapjacks, Film: 25 1/2 min. Available from State Film Library.

### TRANSPARENCIES

**UNIT:** Forest Recreation

**SUB-UNIT:** Exploring Career Opportunities

**OBJECTIVE(S):** The student will be able to:

I. Compare and contrast the career opportunities related to forest recreation.

II. List some of the ways in which a career in this area complements or fails to complement life goals.

III. ....

**UNIT:** Forest Recreation
**SUB-UNIT:** Exploring Career Opportunities

## OBJECTIVES

The student will be able to:

I. Compare and contrast the career opportunities related to forest recreation.

   A. List the major career opportunities related to the maintenance or improvement of forest recreation.

   B. Classify the career opportunities as to occupational levels, i.e., professional, technical, etc.

   C. List the major competencies required for at least one career related to each of the major occupational areas, e.g., park planning.

   D. List the major activities performed by a person employed in at least one occupation associated with each of the major occupational areas.

   E. List the educational requirements of at least one job in each of the major occupational areas.

   F. ....

## LEARNING ACTIVITIES

I. Interview people employed in careers related to forest recreation.

- Prepare an in-depth report on at least two occupations in forest recreation which are of special interest.
- Perform and/or observe some of the more typical tasks encountered by people employed in the jobs which are of greatest interest to you.
- Arrange to spend an afternoon or full day with a person holding a job of your choice in forest recreation.
- Seek occupational work experience in the occupation of your choice.
- If the occupation of your choice requires further schooling, investigate, with the help of your guidance counselor or teacher, the school's availability.
- As a class project, play "What's My Line" using occupations in this area for "the mystery guest."

**UNIT:** Forest Recreation
**SUB-UNIT:** Exploring Career Opportunities

| TOPICS | RESOURCES |
|---|---|
| I. Career opportunities in or related to forest and outdoor recreation.<br>A. Careers<br>· Park caretaker<br>· Recreational farm manager<br>· Hunting or fishing guide<br>· Recreational forester<br>· Park superintendent<br>· Camp ground manager<br>· ...<br>B. Occupational classification<br>· Professional<br>· Technical<br>· Entry level<br>· ...<br>C. Competencies needed<br>D. Training needed<br>E. ... | I. Local people employed in outdoor recreation, e.g., park superintendents, campgrounds manager, etc.<br>· Local recreational forester<br>· U.S. Department of Health, Education and Welfare. Exploring Occupations in the Natural Resources. p. 37.<br>· Hoover. Handbook of Agricultural Occupations. pp. 263-283.<br>· Smith. Rural Recreation for Profit.<br>· .... |

**UNIT:** Forest Recreation

**SUB-UNIT:** Exploring Career Opportunities

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. List some of the ways in which a chosen career in this area complements or fails to complement life goals.<br>A. List the ways in which a chosen career benefits society.<br>B. List the ways in which a chosen career might benefit the student.<br>C. .... | II. Participate in a class debate of life goals.<br>. Prepare a short paper concerning the ways in which a chosen career complements or fails to complement life goals.<br>. As a class project, prepare a hypothetical radio program. Each student would select and bring from home a record of his choice. He would then prepare a brief "commercial" on the job of his choice. Then, he would act as a disc jockey as he played a record and gave his job brief as the "commercial."<br>. .... |
| III. .... | III. .... |

**UNIT:** Forest Recreation

**SUB-UNIT:** Exploring Career Opportunities

| TOPICS | RESOURCES |
|---|---|
| II. Career benefits | II. Fanning. *Opportunities in Environmental Careers*. Chapter 12. |
| A. Benefits to society | |
| B. Benefits to the individual | . .... |
| C. ... | |
| III. .... | III. .... |

## RESOURCES

UNIT: Forest Recreation

SUB-UNIT: Exploring Career Opportunities

BOOKS

Fanning, Odom. Opportunities in Environmental Careers. New York: Universal Publishing and Distributing Company, 1971.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Smith, Clodus R., Lloyd E. Partain and James R. Champlin. Rural Recreation for Profit. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1968.

U.S. Department of Health, Education and Welfare. Exploring Occupations in the Natural Resources. A Resource Guide for Grades 7-8-9. Washington, D.C.: U.S. Government Printing Office, 1973.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: System Selection

OBJECTIVE(S): The student will be able to:

I. Analyze a given tract of timber in terms of harvestability.

II. When given a contract for harvesting a given tract of timber, interpret the contract.

III. Based on a given set of variables (terrain, type of cut, size tract, etc.) select a system of harvest.

IV. ....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** System Selection

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. Plan the harvesting of a given tract of pulpwood. | |
| A. Analyze a given tract in terms of its harvestability.<br>1. Given a contour map of a given site, detect and locate, on a map, terrain problems.<br>2. Given a soils map of a given site, list the anticipated equipment-use problems.<br>3. Given a cruise report of a given site, detect and locate, on a map, if high and low density.<br>4. Given a cruise report and map of the site, locate necessary roads.<br>5. Given a cruise report and map of the site, locate areas of dense vegetation.<br>6. .... | A. Visit the tract chosen by the class to be harvested and study the terrain, stand density, tree characteristics, roads, vegetative career, etc.<br>. Obtain a map or aerial photograph of the tract and study the terrain and tree growth.<br>. Practice locating roads and landing sites by studying the maps.<br>. Practice differentiating between areas which can be harvested under rainy conditions and those which cannot.<br>. Try to use the cruise report of the tract to locate roads and landing - then check results by visiting the site.<br>. .... |
| B. When given a contract for cutting a tract of timber , interpret the terms of the contract.<br>1. Interpret marking provided by the cruiser if selective cutting is to be the method of harvest.<br>2. Select trees for selective cutting if marking has not been provided.<br>3. Identify boundaries.<br>4. Interpret tree size and species according to the contrast.<br>5. ..... | B. Obtain a contract (perhaps the one used in the unit on buying) and compare interpretations of the class members.<br>. Obtain a copy of a contract being used by local pulpwood dealers and discuss interpretations.<br>. .... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** System Selection

| TOPICS | RESOURCES |
|---|---|
| A. Harvestability of a site<br>1. Terrain<br>2. Contour<br>3. Soil type<br>4. Stand density<br>5. Roads<br>6. ... | I. Bromley. Pulpwood Production. Unit F.<br>. Local pulpwood dealers<br>. .... |
| B. Contract interpretation<br>1. Determine boundaries<br>2. Size trees to be cut<br>3. Identification of tree markings<br>4. Tree selection<br>5. ... | B. Local pulpwood dealers<br>. ... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** System Selection

## OBJECTIVES

C. Select an appropriate harvesting system for a given site and contract, e.g., clear cutting, selection, etc.

1. Compare and contrast different harvesting systems.
    a. List the advantages and disadvantages of a shortwood stump-to-stump system for a given set of conditions.
    b. List the advantages and disadvantages of a partially mechanized shortwood system.
    c. List the advantages and disadvantages of a typical fully mechanized shortwood system.
    d. List the advantages and disadvantages of a typical partially mechanized longwood system.
    e. List the advantages and disadvantages of a typical, fully mechanized longwood system.
    f. Compare and contrast longwood and shortwood systems.
    g. ....
2. ....

## LEARNING ACTIVITIES

C. As a class project, plan the harvest of a tract of pulpwood.

- Observe as many different systems of harvest as possible in the local area.
- Select a system of harvest for the class project tract for a fictitious contract which calls for clear cutting.
- ....

UNIT: Harvest Planning and Management
SUB-UNIT: System Selection

| TOPICS | RESOURCES |
|---|---|
| C. System selection | C. Bromley. Pulpwood Production. Unit E. |
| 1. Harvest system comparison | . Local pulpwood dealers |
| a. Shortwood (pulpwood) | . ..... |
| 1. Non-mechanized (stump-to-stump) | |
| 2. Partially mechanized (prehauling) | |
| 3. Fully mechanized | |
| . Busch combine | |
| . Omark harvester | |
| . ..... | |
| b. Longwood (pulpwood or saw timber) | |
| 1. Partially mechanized | |
| 2. Fully mechanized | |
| . L. R. A. | |
| . Log-All (feller-skidder)<br>. Arbomatib (roadside processor) | |
| . Beloit system (pulpwood) | |
| . Harvester | |
| . Beloit chokerless skidder | |
| . Truck mounted heel-boom loader | |
| . ..... | |

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: System Selection

| BOOKS | FILMS AND FILM STRIPS |
|---|---|
| Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969. | |
| BULLETINS | TRANSPARENCIES |
| | |

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

OBJECTIVE(S): The student will be able to:

I. When given a set of variables (terrain, type timber, time, etc.), select the felling equipment or machinery needed for a given harvest operation.

II. When given a set of variables, select the limbing and bucking equipment needed for a given harvest operation.

III. When given a set of variables, select the skidding and/or prehauling equipment needed for a given operation.

IV. When given a set of variables, select the loading equipment needed for a given harvest operation.

V. When given a set of variables, select the hauling equipment needed for a given harvest operation.

VI. ....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Machinery and Equipment Selection

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. When given a set of variables (harvest system, terrain, volume, labor supply, etc.), select the type, size and amount of machinery, and equipment needed for a given harvest operation. | I. As a class project or in small groups, select the machinery needed for a typical or actual harvesting operation in the local community and select the equipment needed.<br>. Prepare a picture display of machinery used in typical harvesting operations in the local community.<br>. .... |
| A. Select the felling equipment needed for a given harvest system.<br>1. List the major variables involved in selecting felling equipment.<br>2. List and compare the more commonly used felling equipment as to their cost (fixed and variable), rate of production (in a given condition) and labor requirements.<br>a. Compare and contrast shears.<br>b. Compare the bow-blade chain saw with the straight blade chain saw.<br>c. .... | A. Invite a local machinery dealer to discuss felling equipment with the class.<br>. Invite a local harvester to discuss felling equipment with the class.<br>. While visiting local harvesting operations, observe the type(s) of felling equipment being used.<br>. Obtain brochures or other literature from manufacturers of felling equipment.<br>. Prepare a check list of variables to consider in comparing different types of felling equipment.<br>. Invite local machinery dealers to demonstrate chain saws, shears, or other felling equipment.<br>. .... |
| B. .... | B. .... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Machinery and Equipment Selection

| TOPICS | RESOURCES |
|---|---|
| I. Machinery and equipment selection<br>A. Felling equipment<br>1. Variables involved<br>. Costs<br>. Production rate<br>. Labor requirements<br>. ...<br>2. Types of equipment<br>. Chain saws<br>. Bow blade<br>. Straight blade<br>. Direct drive<br>. Indirect drive<br>. Shears<br>. ... | I-A. Bromley. Pulpwood Production. Unit J.<br>. Local equipment dealers<br>. Manufacturer's brochures<br>. Local pulpwood producers<br>. Omark Industries. All About Chain Saws.<br>. .... |
| B. .... | B. .... |

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Machinery and Equipment Selection

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. When given a set of variables, select the limbing and bucking equipment needed for a given harvest operation.<br>A. List the major variables involved in selecting limbing and bucking equipment.<br>B. List and compare the more commonly used limbing and bucking equipment as to costs (fixed & variable), rate of production (under given use conditions) and labor requirements.<br>1. Compare and contrast straight vs bow blade chain saws for limbing and bucking.<br>2. Compare and contrast direct vs indirect drive chain saws for limbing and bucking.<br>3. ....<br>C. .... | II. Invite local machinery dealers to demonstrate chain saws.<br>. Obtain and file manufacturer's brochures or other literature concerning limbing and bucking equipment.<br>. Invite a pulpwood harvester to discuss his recommendations concerning limbing and bucking equipment based on his experiences.<br>. While visiting a local harvesting operation, observe the types of limbing and bucking equipment being used.<br>. As a class project, compare the efficiency of the three or four major types of chain saws for limbing and bucking.<br>. Use the major types of chain saws and make your own comparison.<br>. .... |
| III. When given a set of variables, select the skidding and/or prehauling equipment needed for a given operation.<br>A. List the major variables involved in selecting skidding and/or prehauling equipment. | III. Invite local machinery dealers to demonstrate skidders and/or prehaulers.<br>. Obtain brochures and other literature from manufacturers.<br>. While visiting local harvesting operations, observe the use of skidders and prehaulers.<br>. Prepare a checklist of variables to consider in selecting skidders or prehaulers and use this checklist to summarize comparisons. |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Machinery and Equipment Selection

| TOPICS | RESOURCES |
|---|---|
| II. Limbing and bucking equipment<br>A. Variables involved<br>. Production rate<br>. Costs<br>. Labor requirements<br>. ...<br>B. Types of equipment<br>. Chain saws<br>. Bow blade<br>. Straight blade<br>. Direct drive<br>. Indirect drive<br>. Axes<br>. ...<br>C. .... | II. Bromley. *Pulpwood Production.* Unit J.<br>. Local equipment dealers<br>. Manufacturer's brochures<br>. Local pulpwood producers<br>. .... |
| III. Skidding and prehauling equipment<br>A. Variables involved<br>. Production rate<br>. Costs<br>. Labor requirements<br>. ... | III. Bromley. *Pulpwood Production*. Unit K.<br>. Local equipment dealers<br>. Manufacturer's brochures<br>. Local pulpwood producers<br>. Local skidder or prehauler operators<br>. .... |

UNIT: Harvest Planning and Management
SUB-UNIT: Machinery and Equipment Selection

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| B. List and compare the more commonly used skidding and prehauling equipment as to costs (fixed and variable), rate of production (under given use conditions), and labor requirements (type and amount). | . Ask skidder and prehauler operators to evaluate the types they have used.<br>. Observe demonstrations of and/or operate different skidders and prehaulers - (the forestry field day may provide such an opportunity).<br>. ..... |
| 1. Compare and contrast prehaulers with tires vs those with tracks for a given operation. | |
| a. List two advantages and two disadvantages of tires. | |
| b. List two advantages and two disadvantages of tracks. | |
| c. ..... | |
| 2. Compare and contrast the prehauler vs the skidder for a given harvest operation. | |
| a. List at least two advantages and disadvantages of the skidder. | |
| b. List at least two advantages and disadvantages of the prehauler. | |
| c. ..... | |
| 3. ..... | |
| C. .... | |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Machinery and Equipment Selection

| TOPICS | RESOURCES |
|---|---|
| B. Types of equipment<br>. Skidders<br>. Wheel vs track<br>. Diesel vs gas<br>. .....<br>. Prehaulers<br>. Lift vs trailer<br>. Wheel vs track<br>. Diesel vs gas<br>. .....<br>. .....<br>C. ..... | |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Machinery and Equipment Selection

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| IV. When given a set of variables, select the loading equipment needed for a given harvest operation.<br>A. List the major variables involved in selecting loading equipment.<br>B. List and compare the more commonly used loading equipment as to costs (fixed and variable), rate of production (under given loading conditions), and labor requirements (type and amount).<br>1. List at least two advantages and disadvantages of the pallet system.<br>2. List at least two advantages and disadvantages of the "Big-Stick" loader.<br>3. List at least two advantages and disadvantages of the crane loader.<br>4. List at least two advantages and disadvantages of the front-end fork loader.<br>5. List at least two advantages and disadvantages of hydraulic loading (knuckle-boom or heel-boom).<br>6. .....<br>C. .... | IV. Invite local dealers to demonstrate loading equipment.<br>. Obtain brochures or other literature from manufacturers of loading equipment.<br>. While visiting local harvesting operators, observe the loaders being used.<br>Prepare a checklist of variables to consider in selecting loaders and use the checklist to summarize comparisons.<br>. Ask loader operators or pulpwood producers to compare types of loaders.<br>. Observe demonstrations of and/or operate loaders (the forestry field day may provide an opportunity for this).<br>. Operate the scale-model knuckle-boom loader available to forestry classes in South Carolina.<br>. ..... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Machinery and Equipment Selection

| TOPICS | RESOURCES |
|---|---|
| IV. Loading equipment | IV. Bromley. Pulpwood Production. Unit M. |
| A. Variables involved | . Local equipment dealers |
| . Production rate | . Manufacturer's brochures |
| . Costs | . Local pulpwood producers |
| . Fixed | . Local loader operators |
| . Variable | . ...... |
| . ..... | |
| . Labor requirements | |
| . ..... | |
| B. Types of loaders | |
| . Front-end fork-lift type | |
| . Crane | |
| . Hydraulic | |
| . Knuckle-boom | |
| . Heel-boom | |
| . ..... | |
| C. ..... | |

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Machinery and Equipment Selection

## OBJECTIVES

V. When given a set of variables, select the hauling equipment needed for a given harvesting operation.

A. List the major variables involved in selecting hauling equipment.

B. List and compare the more commonly used hauling equipment as to costs (fixed and variable), rate of production (under given hauling conditions), and labor requirements (fixed and variable).

1. List at least two advantages and disadvantages of single axle, short body trucks ("bobtail" trucks).
2. List at least two advantages and disadvantages of the "false" tandem-axle truck and the tandem-axle truck.
3. List at least two advantages and disadvantages of a truck and trailer for hauling pulpwood.
4. Compare and contrast diesel vs gasoline powered trucks.
5. .....

## LEARNING ACTIVITIES

V. While visiting local harvesting operations, observe the types of hauling equipment being used.

- Invite local harvesters to discuss their experiences with various types of hauling equipment.
- Prepare a checklist of variables to consider in selecting hauling equipment and use this checklist to summarize comparisons.
- Ask to ride with a truck driver on a typical haul.
- Invite local truck and trailer dealers to demonstrate their equipment.
- Obtain brochures and other literature from manufacturers.
- Compare the load capacity of various trucks.
- Make a list of the special accessories observed on hauling equipment, e.g., tires, brakes, etc.
- Ask local truck dealers to discuss special accessories.
- Ask local pulpwood producers to discuss the need for special accessories.
- Ask local pulpwood truck drivers to discuss the need for special accessories.
- .....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Machinery and Equipment Selection

**TOPICS**

V. Hauling equipment selection

A. Variables involved

- Production rate
- Costs
  - Fixed
  - Variable
- Labor requirement
- .....

B. Types of hauling equipment

- Trucks
  - Short "bobtail"
    - Single axle
    - "False" tandem
    - Tandem axle
    - Diesel-gas

- Truck and trailer rigs
  - Semi-trailer
  - Tandem-axle
  - Diesel-gas
  - .....

- Truck accessories

  - Special brakes
  - Special tires
  - Springs
  - ......

**RESOURCES**

V. Bromley. Pulpwood Production. Unit N.

- Local truck dealers
- Manufacturer's brochures
- Local pulpwood producers
- Local pulpwood truck drivers
- .....

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Machinery and Equipment Selection

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| C. Select special truck accessories needed.<br>1. Compare and contrast spring capacity needed for differing local and hauling conditions.<br>2. Compare and contrast tire types for various hauling conditions.<br>3. Compare and contrast brake types and capacities needed for various hauling conditions.<br>4. Compare and contrast types and sizes of trailers needed for various hauling conditions.<br>5. ..... | |
| D. ..... | D. ..... |
| VI. ..... | VI. ..... |

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Machinery and Equipment Selection

| TOPICS | RESOURCES |
|---|---|
| C. ..... | |
| D. .... | |
| VI. ..... | VI. ..... |

## RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Machinery and Equipment Selection

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

FILMS AND FILM STRIPS

BULLETINS

Omark Industries, Oregon Saw Chain Division. All About Chain Saws.

TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: Operational Planning

OBJECTIVE(S): The student will be able to:

I. When given a cruise report and the system of harvest to be used, prepare an operational flow chart of the total harvest and hauling operation.

II. ....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Operational Planning

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. When given a site analysis and the system of harvest to be used, prepare an operational flow chart of the total harvest and hauling operation. | I. As a class project or in small groups, prepare a flow chart of a harvest system(s). |
| A. Given the system of harvest and a cruise report, chart the sequence and estimate the man hours required for each of the major operations involved, i.e., felling, skidding, loading, hauling, etc. | . Prepare a flow chart of the cutting operation.<br>. Prepare a flow chart of the skidding operation.<br>. Prepare a flow chart of the loading operation.<br>. Prepare a flow chart of the hauling operation.<br>. .... |
| B. Given the system of harvest and a cruise report, estimate (within one cord or one mbf) the total daily harvest. | . Visit a harvesting operation in the local area as a class or individually and time the various operations, i.e., cutting, skidding, loading, hauling, etc. |
| C. Given the system of harvest and a cruise report, determine the type of labor required for harvesting a given site. | . Briefly interview workers involved in various harvesting operations to determine the amount of time required to master their jobs. |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Operational Planning

## TOPICS

I. Operational Planning

- A. Charting
  - Felling operations
    - Operational sequence
    - Time consumed
    - ...
  - Skidding operations
    - Operational sequence
    - Time consumed
    - ...
  - Loading operations
    - Operational sequence
    - Time consumed
    - ...
  - Hauling operations
    - Operational sequence
    - Time consumed
    - ...
  - ...
- B. Determining daily production
- C. Determining labor needs

## RESOURCES

I. Bromley. Pulpwood Production. Unit F., also see pp. 213 - 218.

- Local pulpwood harvesters
- Local foresters

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Operational Planning

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| D. Given the system of harvest to be used and a cruise report, prepare a hauling schedule. | . While visiting the harvesting operation, observe the type of hauling, i.e., type roads, distance, loading system, timing, amount of load, etc. |
| E. Given the system of harvest to be used, the hourly volume of wood and the distance to market, select the type(s) of trucks required. | . .... |
| II. .... | II. .... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Operational Planning

| TOPICS | RESOURCES |
|---|---|
| D. Preparing a haul schedule | |
| E. Selecting type of truck for a given harvest operation | |
| II. .... | II. .... |

## RESOURCES

UNIT: Harvest Planning and Management
SUB-UNIT: Operational Planning

BOOKS

Bromley, W. S. *Pulpwood Production.* Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

FILMS and FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: Cost Analysis

OBJECTIVE(S): The student will be able to:

I. Analyze a given timber harvesting operation or facet of the operation and determine profit or loss.

II. ....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Cost Analysis

## OBJECTIVES

The student will be able to:

I. Analyze a given harvest operation or part of such an operation and determine profits or losses.

   A. Determine the gross income from timber harvested for a typical year.

   B. Determine total expenses for a typical year.

      1. Determine stumpage cost for a typical year.
      2. Determine machinery and equipment costs for a typical year.
         a. Determine the fixed cost of a given piece of machinery.
            (1) Determine interest on a given machine.
            (2) When given initial cost average life and salvage price, determine the depreciation cost on a given machine.
            (3) Determine insurance rate on a given machine.
            (4) Determine tax and license cost on a given machine.
            (5) .....
         b. Determine the variable cost of a given machine for a typical year.
            (1) Determine the fuel cost of operating a given machine.
            (2) Determine the maintenance and repair cost of operating a given machine.
            (3) .....
      3. .....

## LEARNING ACTIVITIES

I. As a class project, do an estimated cost analysis of a local harvesting operation.

- Ask a local dealer (producer) to furnish the class with an earnings report - perhaps not the actual one as producers may be sensitive about revealing actual earnings.
- As an individual or member of a committee, investigate the fixed and variable costs of a given machine and report your results to the class.
- As an individual or member of a team, investigate the stumpage costs of an operation.
- Practice solving depreciation of interest problems.
- As an individual or member of a committee, investigate the variable costs of operating a given machine and report your results to the class.
- .....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Cost Analysis

| TOPICS | RESOURCES |
|---|---|
| I. Cost Analysis<br>A. Gross income<br>B. Expenses<br>1. Stumpage costs<br>2. Machinery costs<br>. Fixed<br>. Interest<br>. Depreciation<br>. Insurance<br>. Miscellaneous<br>. .....<br>. Variable<br>. Fuel<br>. Repair and maintenance<br>. .....<br>3. ..... | I. Bromley. Pulpwood Production. pp. 218-224.<br>. Local pulpwood dealers (producers)<br>. Local accountant<br>. ..... |

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Cost Analysis

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| C. Determine labor cost for a given operation on a yearly basis. | C-1. As an individual or member of a committee, investigate in detail the labor cost of a certain operation, e.g., investigate the labor cost per cord of the hauling operation. This might involve "on site" observation. Other committees might be making similar observations of other operations, e.g., loading or skidding. |
| 1. Calculate labor costs for a given operation or part of an operation.<br>a. Calculate, per cord, labor costs involved in felling, limbing, and bucking, using a given system with typical production.<br>b. Calculate, per cord, labor costs involved in skidding or prehauling using a given system with typical production.<br>c. Calculate labor costs involved in loading, using a given system with typical production.<br>d. Calculate labor costs involved in hauling with a given system and with typical production.<br>e. ..... | . Use a yearly earnings report to calculate per cord labor cost by determining the number of men employed in each facet of the operation, their wages, and the total production.<br>. ..... |
| 2. Determine payroll taxes and insurance for a given pulpwood operation for a typical year.<br>a. Calculate the social security tax due on a given employee on a yearly basis.<br>b. Calculate the unemployment tax for a given employee on a yearly basis.<br>c. Calculate workmen's compensation insurance cost on a given employee for a year.<br>d. ..... | 2. Invite an accountant to discuss payroll taxes and insurance costs for a typical harvest operation.<br>. Practice calculating social security payments for employees.<br>. Prepare a chart which lists all payroll deductions and shows calculation formulas.<br>. ..... |
| II. ..... | II. ..... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Cost Analysis

| TOPICS | RESOURCES |
|---|---|
| C. Total labor costs<br>1. Labor costs by facet of operation<br>a. Felling, limbing and bucking<br>b. Skidding and prehauling<br>c. Loading<br>d. Hauling<br>e. ..... | C-1. Bromley. *Pulpwood Production*. Unit O.<br>• Local pulpwood dealers (producers)<br>• ..... |
| 2. Payroll taxes and insurance<br>a. Social security<br>b. Unemployment insurance<br>c. Workmen's compensation tax<br>d. ..... | 2. Bromley. *Pulpwood Production*. pp. 218-224.<br>• Local pulpwood dealers (producers)<br>• Local accountant<br>• ..... |
| II. ..... | II. ..... |

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Cost Analysis

| | |
|---|---|
| BOOKS<br>Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969. | FILMS AND FILM STRIPS |
| BULLETINS | TRANSPARENCIES |

UNIT: Harvest Planning and Management

SUB-UNIT: Records and Insurance

OBJECTIVE(S): The student will be able to:

I. Plan a record keeping system for a given timber harvesting business.

II. Plan an insurance protection program for a given timber harvesting operation.

III. ....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Records and Insurance

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| I. Plan a record keeping system for a given timber harvesting business. | I. As a class or small group project, plan a record keeping system for a typical harvesting business.<br>. Invite the bookkeeper or local dealer to discuss his system with the class. |
| A. Plan a record keeping system for revealing operating efficiency.<br>1. Plan labor efficiency report.<br>2. Plan a machinery efficiency report.<br>3. .... | A. As a class or small group project devise a record keeping system which will reveal profits and/or losses for the total operation or significant smaller operations.<br>. Prepare a set of fictitious expenses and receipts for a period of time (perhaps a quarter) and enter such data in a record book.<br>. Invite a teacher of bookkeeping to serve as a resource person in planning the bookkeeping system.<br>. Invite a local dealer to discuss record used to reveal operating efficiency.<br>. .... |
| B. Plan a record keeping system for facilitating government records.<br>1. List the required payroll deductions of a typical employee, e.g., income tax, social security, unemployment insurance, etc.<br>2. List the information needed to determine the income tax deductions for a typical employee.<br>3. List the information needed to determine the social security deductions for a typical employee.<br>4. .... | B. As a class project or in small groups, plan a record keeping system f[illegible] facilitating government records.<br>. Prepare a checklist of records needed for a typical employee, e.g., total wages, age, family size, days worked, etc.<br>. Prepare a checklist of payroll deductions for a typical employee, e.g., Federal Income Tax, social security, workmen's compensation, unemployment insurance, etc.<br>. Prepare a social security deduction for a typical employee. |

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Records and Insurance

| TOPICS | RESOURCES |
|---|---|
| I. Record keeping system<br>A. Records for operational efficiency<br>. Labor production<br>. Machinery production<br>. ...<br>B. Records required for government reports for employees<br>. Income tax<br>. State<br>. Federal<br>. ...<br>. Social Security<br>. Unemployment insurance<br>. ... | I. Bromley. Pulpwood Production. Unit P.<br>. Local high school business teacher<br>. Local pulpwood producers<br>. .... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Records and Insurance

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| C. List the records needed for preparing federal income tax on the business. | C. Prepare an income tax deduction for a typical employee. |
| 1. List the major deductible items, e.g., losses, gasoline or diesel fuel, Federal Excise Tax on tires, trucks and accessories, Federal Highway use Tax or vehicle license, etc. | • Prepare a checklist of deductible tax items for a typical timber harvesting operation. |
| 2. .... | • .... |
| D. .... | D. .... |
| II. Plan an insurance protection program for a given timber harvesting business. | II. Prepare a checklist of insurances needed by a typical timber harvesting business. |
| A. List at least three reasons for having public liability insurance. | • Invite a local insurance agent to discuss insurances needed by a harvester. |
| B. List at least three reasons for having motor vehicle insurance. | • Invite a local pulpwood dealer to discuss insurance needed for his business. |
| C. List at least three reasons for having loss insurance such as wind, hail, robbery, etc. | • .... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Records and Insurance

| TOPICS | RESOURCES |
|---|---|
| C. Business records for taxes<br>· Cost and receipt records<br>· Inventory records<br>· Depreciation records<br>· Deductible items<br>  · Gasoline or fuel tax<br>  · Truck and tire excise tax<br>  · Vehicle license or road tax | |
| D. ... | D. ... |
| II. Insurance<br>A. Public liability<br>B. Motor vehicle<br>C. Property loss<br>· Caused by nature<br>  · Wind<br>  · Hail<br>  · Flood<br>  · ...<br>· Intentional acts of man<br>  · Vandalism<br>  · Attempted theft<br>  · ...<br>· Criminal acts<br>  · Burglary<br>  · Robbery<br>  · Forgery | II. Bromley. Pulpwood Production. Unit P.<br>· Local pulpwood producers<br>· Local insurance salesmen<br>· .... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Records and Insurance

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| D. List at least three reasons for having workmen's compensation on all employees.<br>E. ....<br>III. .... | |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Records and Insurance

| TOPICS | RESOURCES |
|---|---|
| . Embezzlement<br>. ...<br>. Fire<br>D. Workmen's compensation<br>E. ...<br>III. .... | |

RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Records and Insurance

| | |
|---|---|
| BOOKS<br>Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969. | FILMS AND FILM STRIPS |
| BULLETINS | TRANSPARENCIES |

UNIT: Harvest Planning and Management

SUB-UNIT: Cruising

OBJECTIVE(S): The student will be able to:

I. When given the necessary equipment and a map of the tract, estimate, within 5%, the actual volume of a given tract.

II. ....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Cruising

## OBJECTIVES

The student will be able to:

I. Plan the purchase of a given tract of timber for pulpwood.

  A. Determine the value of a given tract of timber.

    1. Given the necessary equipment, prepare a cruise report which estimates the quantity of timber in a given tract (within one cord or one mbf of the actual amount).

      a. Given a scale map and the total acreage of a tract of timber, perform a 5% or 10% cruise which estimates within 5% the actual volume of timber on a given tract.

        (1) Given the acreage of a tract, determine the number of 1/4 or 1/5 acre plots needed for a 5% or 10% cruise.

        (2) Given a scale map of an aerial photograph of a tract, uniformly locate the 1/4 or 1/5 acre plots to be cruised.

        (3) Step-off a 1/4 or 1/3 acre plot.

        (4) Given a chain or yard tape, determine, within 5% of the actual acreage, the total area of a given tract.

        (5) Given a compass and chain or yard tape, locate the plot centers.

        (6) ....

## LEARNING ACTIVITIES

I. As a class project, and with the permission of the owner of a tract of standing timber, cruise a tract of timber.

  A. As a class project cruise a tract of timber in the local community using a 5% or 10% sample.

  - Obtain a map or photograph of the tract and determine acreage, if not given.
  - As a class project, measure the acreage in the tract using a chain.
  - Individually, or as a class, prepare a survey grid.
  - Observe demonstrations of and/or individually or in groups, practice using a compass to locate the plot centers on the actual tract.
  - Observe demonstrations of and/or layout a 1/4 or 1/5 acre plot.

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Cruising

| TOPICS | RESOURCES |
|---|---|
| I. Acquisition of standing timber<br>A. Value determination<br>1. Quantity estimation<br>a. Sampling<br>(1) Determining number of plots needed for sampling<br>(2) Locating plots on map<br>(3) Locating plots on site<br>(4) Measuring plots<br>(5) Measuring tracts<br>(6) .... | I. Bromley. Pulpwood Production. pp. 31-40.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina.<br>. Anderson and Smith. Forests and Forestry. Chapter 3.<br>. Local timber buyers<br>. Local foresters or forestry extension agents |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Cruising

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| b. Given a clinometer and diameter tape, determine the volume of wood in a given tree. | . Observe demonstrations of and/or individually determine the volume of a tree using a Biltmore stick. |
| (1) Given a Biltmore stick, determine the value of timber in a given tree. | |
| (2) Given a clinometer and a diameter tape, determine the volume of a given tree. | . Observe demonstrations of and/or individually determine the volume of a tree using a clinometer and a diameter tape. |
| (3) .... | |
| c. Correctly use the dot tally method of recording the volume of timber cruised. | . Observe demonstrations of and/or use the dot tally system to record plot volumes. |
| d. Mark trees for selective cutting according to product, i.e., pulpwood, poles, saw timber, etc. | . Conduct a contest among teams of students to determine which team can most accurately estimate the volume of a 1/4 or 1/5 acre plot of standing pulpwood and/or saw timber. |
| e. .... | |
| B. .... | . ... |
| II. .... | II. .... |

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Cruising

| TOPICS | RESOURCES |
|---|---|
| b. Tree volume determination | |
| (1) Use of Biltmore stick | |
| (2) Use of clinometer and diameter tape | |
| (3) ..... | |
| c. Use of the dot-tally | |
| d. ..... | |
| B. ..... | |
| II. ..... | II. ..... |

RESOURCES

UNIT: Harvesting Planning and Management

SUB-UNIT: Cruising

BOOKS

Anderson, David A. and W. S. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Vocational Education Media Center in coopertion with the South Carolina Division of Vocational Education, 1974.

FILMS AND FILM STRIPS

BULLETINS

TRANSPARENCIES

UNIT: Harvest Planning and Management

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities related to the harvest planning and management with careers in other areas of forestry.

II. List the ways in which a given career associated with harvest planning and management complements or fails to complement life goals.

III. .....

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. Compare and contrast career opportunities related to harvest planning and management.<br>A. List the major careers related to harvest planning and management.<br>B. Classify the careers as to occupational level, i.e., professional, technical, service, etc.<br>C. List the major competencies needed for each of these careers.<br>D. List the major activities performed by persons employed in such positions.<br>E. List the educational requirements and sources of such education.<br>F. ..... | I. Interview as many people employed in harvest planning as is feasible.<br>. Prepare an in-depth report of a position of most interest.<br>. Perform as many of the tasks performed by people employed in the position or positions of most interest as is feasible.<br>. Arrange to spend a day or half-day with a harvest planner and/or manager.<br>. Seek occupational work experience as an assistant to a person involved in harvest planning and management.<br>. If the position involves their schooling, investigate with your guidance counselor the schools available.<br>. ...... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Exploring Careers

## TOPICS

I. Career opportunities in harvest planning and management.

A. Career titles

1. Cruiser
2. Extension Agent
3. Pulpwood dealer (producer)
4. Forestry consultant
5. Logging operation's manager

B. Career classification

1. Professional
2. Technical
3. Service
4. .....

C. Competencies needed

1. Knowledge
2. Skills
3. Attitudes
4. .....

D. Major activities

E. Educational requirements

F. .....

## RESOURCES

I. Bromley. Pulpwood Production. Unit A.

- Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 1.
- Hanaburgh. Your Future in Forestry.
- Hoover. Handbook of Agricultural Occupations. Chapter XIII.
- Local timber harvesters
- Logging foreman
- Local guidance counselor
- Teacher of agriculture
- Film: The American Forester. 14 1/2 min.
- .....

**UNIT:** Harvest Planning and Management

**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. List the ways in which a given career associated in harvest planning and management complements or fails to complement life goals. | II. Prepare a short paper concerning the ways in which a career in this field would complement or fail to complement life goals. |
| A. List the ways in which a given career benefits society. | . Participate in a class debate of life goals. |
| B. List the ways in which a given career might benefit an individual. | . Investigate the living conditions of a person employed in the position to which you aspire. |
| C. ..... | . ..... |
| III. ..... | III. ..... |

**UNIT:** Harvest Planning and Management
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| II. Career Evaluation | II. Hoover. Handbook of Agricultural Occupations. Chapter 1. |
| A. Life goals | . Local guidance counselor |
| B. Benefits to society | . ..... |
| C. Benefits to the individual | |
| D. ..... | |
| III. | III. ..... |

## RESOURCES

UNIT: Harvest Planning and Management

SUB-UNIT: Exploring Careers

BOOKS

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Hanaburgh, David H. Your Future in Forestry. New York: Arco Publishing Company, Inc., 1971.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Kirkley, F. W. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Vocational Education Media Center cooperating with the South Carolina Division of Vocational Education, 1974.

FILMS AND FILM STRIPS

S. C. Commission of Forestry. P. O. Box 287, Columbia, South Carolina 28202. The American Forester, 14 1/2 min.; Man in Green, 28 min.

BULLETINS

TRANSPARENCIES

UNIT: Harvest Operations

SUB-UNIT: Felling, Limbing and Bucking

OBJECTIVE(S): The student will be able to:

I. Fell a given tree and achieve the desired direction of fall using a chain saw.

II. Fell a given tree and achieve the desired direction of fall using hydraulic shears.

III. Limb, mark and buck a given tree.

IV. . . . . .

**UNIT:** Harvest Operations

**SUB-UNIT:** Felling, Limbing and Bucking

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Plan the felling, limbing, and bucking of trees using a given method.<br>A. Fell a given tree and achieve the desired direction of fall using a given type chain saw.<br>1. Given terrain, wind, and vegetation information, select the most appropriate landing site for a given tree.<br>2. Identify the natural fall direction of a given tree.<br>3. Notch a tree to achieve a desired fall using a chain saw and axe.<br>4. Make the trunk cut using a chain saw.<br>5. Determine the need for wedging.<br>a. Select an appropriate wedge for a given situation.<br>b. Install a wedge.<br>c. List at least 5 factors which determine the need for wedging.<br>6. List at least 5 safety hazards involved in felling a tree.<br>7. . . . . .<br>B. . . . . . | I. As a class project, harvest a small plot of pulpwood saw timber using a chain saw.<br>. Observe demonstration(s) and/or demonstrate safe tree felling.<br>. Diagram an appropriate notch and cut.<br>. Observe demonstrations of and/or practice felling trees to achieve a desired direction of fall when special conditions exist, e.g. wind is blowing in the opposite direction, the tree is crooked and leans in a different direction, etc.<br>. Observe demonstrations of the safe operation of the chain saw.<br>. Observe demonstrations of and or practice carrying a chain saw from tree to tree in a safe manner.<br>. Observe demonstrations of wedging and practice wedging.<br>. Visit a harvesting operation and observe experienced workers as they fell trees.<br>. . . . . . |
| II. Fell a given tree using hydraulic shears. | II. Observe demonstrations of the use of hydraulic shears for felling.<br>. . . . . . |
| III. Safely limb, mark and buck a given tree. | III. Observe demonstrations of and/or limb and buck trees using a chain saw and/or axe. |

**UNIT:** Harvest Operations
**SUB-UNIT:** Felling, Limbing and Bucking

| TOPICS | RESOURCES |
|---|---|
| I. Felling, limbing and bucking<br>A. Felling by chain saw<br>. Selecting landing site<br>. Brush clearing<br>. Lean assessment<br>. Notching<br>. Trunk cut<br>. Wedging<br>. Safety<br>B. .... | I. Bromley. Pulpwood Production. Unit J.<br>. Kirkley. Basic Forestry for Vocational Students in South Carolina. Lesson 2.<br>. Local pulpwood producers<br>. Omark Industries. All About Using Chain Saws.<br>. . . . . . |
| II. Felling by hydraulic shears | II. Bromley. Pulpwood Production. Unit J. pp. 144-6. |
| III. Limbing, marking and bucking | III. Bromley. Pulpwood Production. Unit J.<br>. Local pulpwood producers<br>. Omark Industries. All About Using Chain Saws.<br>. . . . . . |

**UNIT:** Harvesting Operations
**SUB-UNIT:** Felling, Limbing and Bucking

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| A. Diagram the sequence for limbing, i.e., butt to top, etc.<br>B. Determine the total length to be limbed.<br>C. Measure and mark the tree for subdivision into proper lengths.<br>D. Buck the felled tree into length specified by the dealer.<br>E. Diagram the appropriate sequence for bucking.<br>F. List at least 6 safety hazards involved in limbing and bucking.<br>G. Select an appropriate axe for limbing.<br>H. . . . . . | . Observe special demonstrations of safety hazards involved in limbing and bucking, e.g., binding, spring effect of bend trees, etc.<br>. Observe demonstrations of the safe and efficient use of an axe in limbing.<br>. Visit a harvesting operation and observe the limbing and bucking operations.<br>. . . . . . |
| IV. . . . . . | IV. . . . . . |

**UNIT:** Harvest Operations
**SUB-UNIT:** Felling, Limbing and Bucking

| TOPICS | RESOURCES |
|---|---|
| A. Limbing | |
| . Sequence | |
| . Length determination | |
| B. Marking | |
| C. Bucking | |
| . Sequence | |
| . . . . . . . | |
| D. Safety | |
| E. . . . . . . | |
| IV. . . . . . . | IV. . . . . . . |

## RESOURCES

UNIT: Harvest Operations

SUB-UNIT: Felling, Limbing and Bucking

BOOKS

Bromley, W.S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S.C.: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

FILMS AND FILM STRIPS

BULLETINS

Omark Industries. Oregon Saw Chain Division. All About Using Chain Saws.

TRANSPARENCIES

UNIT: Harvest Operations

SUB-UNIT: Skidding and Prehauling

OBJECTIVE(S): The student will be able to:

I. Skid or prehaul felled timber from the stump to a landing.

  A. Load and operate a wheel type skidder to move long bolt pulpwood or saw timber from the stump to the landing.

  B. Load and operate a wheel type prehauler to transport short type pulpwood from the stump to the landing.

  C. Rig a choker system for a given skidder operation.

  D. .....

II. .....

**UNIT:** Harvest Operations
**SUB-UNIT:** Skidding and Prehauling

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Skid or prehaul felled timber from the stump to the landing. | I. As a class project or demonstration, practice using skidders and/or prehaulers to move pulpwood from the stump to the landing. |
| A. Load and operate a wheel-type skidder to move long bolt pulpwood or saw timber from the stump to the landing.<br>1. Attach choke cable.<br>2. Operate a skidder winch.<br>3. Operate a wheel-type skidder.<br>4. List at least five safety factors involved in using a wheel-type skidder.<br>5. ..... | A. Observe demonstrations of and/or attach choker cables to long bolt pulpwood for moving from stump to landing.<br>. Observe demonstations of and/or operate a wheel skidder to transport long bolt pulpwood from the stump to the landing.<br>. Observe safety demonstrations designed to show safety hazards.<br>. Visit a harvesting operation and observe skidding.<br>. ..... |
| B. Load and operate a wheeled prehauler to move short bolt pulpwood from the stump to the landing.<br>1. Load a typical wheeled prehauler.<br>2 Operate a typical wheeled prehauler.<br>3. ..... | B. Observe demonstrations of and/or load a typical wheel-type prehauler using a winch cable.<br>. Observe demonstrations of and/or operate a typical wheel-type prehauler.<br>. Visit a harvesting operation and observe prehauling.<br>. ..... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Skidding and Prehauling

| TOPICS | RESOURCES |
|---|---|
| I. Skidding and prehauling<br>A. Skidder loading and operation<br>1. Attaching choker cables<br>2. Operating skidder winch<br>3. Skidder operation<br>4. Safety | I.-A. Bromley. Pulpwood Production. Unit K.<br>. Local pulpwood producers<br>. ..... |
| B. Loading and operating prehaulers<br>1. Loading systems<br>. Pallet<br>. Grapple<br>. .....<br>2. Operation<br>3. Safety<br>4. ..... | B. Bromley. Pulpwood Production. Unit K.<br>. Local pulpwood producers<br>. ..... |

**UNIT:** Harvest Operations

**SUB-UNIT:** Skidding and Prehauling

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| C. Rig a choker system for given skidder and winch. | C. Observe demonstrations of and/or attach chokers for winching. |
| 1. Diagram a typical choker system. | . Observe demonstrations of and/or operate a typical winch. |
| 2. List at least two types of cables. | |
| 3. Demonstrate the "rule of thumb" for winding cables over a winch drum. | . Observe demonstrations and/or conduct simulations of the "rule of thumb" for winding cables on a drum. |
| 4. List at least five safety hazards involved in using winches and cables. | . Observe winch safety demonstrations. |
| 5. ..... | . ..... |
| D. ..... | D. ..... |
| II. ..... | II. ..... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Skidding and Prehauling

| TOPICS | RESOURCES |
|---|---|
| C. Rigging a choker system<br>1. Cable types<br>2. Chokers<br>3. Winding cables<br>4. Safety<br>5. ..... | C. Bromley. Pulpwood Production. Unit L.<br>. Local pulpwood producers<br>. ..... |
| D. ..... | D. ..... |
| II. ..... | II. ..... |

RESOURCES

UNIT: Harvest Operations
SUB-UNIT: Skidding and Prehauling

| | |
|---|---|
| BOOKS<br>Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969. | FILMS AND FILM STRIPS |
| BULLETINS | TRANSPARENCIES |

UNIT: Harvest Operations

SUB-UNIT: Loading and Hauling

OBJECTIVE(S): The student will be able to:

1. Load a given type of pulpwood using a given method and loading equipment.
    - A. Load short stick pulpwood using a front-end or fork-lift type loader.
    - B. Load short or long stick pulpwood using a knuckle-boom type loader.
    - C. Load a given truck using the pallet system with a winch or "Big-Stick".
    - D. Arrange a load such that proper weight and balance are achieved.
    - E. Transport pulpwood or saw logs from a given loading area to a given market via a given truck.
    - F. ....

II. ....

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. Load a given type of pulpwood using a given method and loading equipment. | I. Observe demonstrations of and/or practice loading pulpwood using different methods and loading equipment.<br>· Visit local harvesting operations and observe different methods of loading. |
| A. Load short stick pulpwood using a front-end lift type loader.<br>1. Given typical choker cables used on such loaders, attach and release such chokers.<br>2. Given a typical front-end loader, operate both the lift controls and the vehicle itself.<br>3. List 5 safety hazards involved in the use of this machine.<br>4. Perform daily maintenance on the loader.<br>5. .... | A. Observe demonstrations of and/or practice loading short stick pulpwood using the front-end lift type loader.<br>· Observe demonstrations of the safety hazards involved in the use of such equipment.<br>· Observe demonstrations of and/or perform daily maintenance on such equipment.<br>· Visit a harvesting operation where such equipment is being used and observe its use.<br>· .... |
| B. Load short or long bolt pulpwood or saw logs using a knuckle-boom loader.<br>1. Given a typical knuckle-boom loader, safely operate the vehicle.<br>a. Identify all controls.<br>b. Perform at least six basic maneuvers. | B. Observe demonstrations of and/or practice using a typical knuckle-boom loader for loading both long and short stick pulpwood.<br>· Observe safety demonstrations.<br>· Observe demonstrations of and/or perform daily maintenance on a typical knuckle-boom loader.<br>· Practice control exercises used in the Knuckle-boom Loader Manual. |

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| TOPICS | RESOURCES |
|---|---|
| I. Loading<br>A. Using the front-end or fork-lift loader.<br>1. Choker attachment and release<br>2. Lift controls<br>3. Vehicle controls<br>4. Safety hazards<br>5. Daily maintenance<br>6. ... | I. Bromley. *Pulpwood Production*. Unit M.<br>. Owners' manuals<br>. Local loader operators<br>. .... |
| B. Using the knuckle-boom loader.<br>1. Vehicle<br>. Control identification<br>. Daily maintenance<br>. Safety hazards<br>. ...<br>2. Grapple<br>. Control identification<br>. Basic maneuvers<br>. Safety hazards | B. Bromley. *Pulpwood Production*. Unit M.<br>. Manufacturer's or operator's manuals<br>. Local loader operators<br>. .... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| c. List at least 5 safety hazards involved in using the grapple. | . Practice using the knuckle-boom loader simulator. |
| d. Perform daily maintenance procedures on the grapple. | . .... |
| e. .... | |
| 2. When given long bolt pulpwood to be loaded, the student will be able to select the point on the log to attach the grapple. | |
| 3. When given more than one log to lift in one carry, the student will be able to select a maximum load. | |
| 4. .... | |
| C. Load a short truck or trailer truck using the pallet and/or "Big-Stick" system. | C. Observe demonstrations of and/or practice loading a truck using a typical pallet and winch system. |
| 1. Given a typical pallet and winch system, operate the winch and/or winch and boom to load short stick pulpwood. | . Observe demonstrations of the safety hazards involved in the use of this system. |
| 2. List at least 5 safety hazards involved in using a winch and/or "Big-Stick" pallet system. | . Observe and/or perform daily maintenance equipment used in this system. |
| 3. Perform daily the maintenance needed on such a system. | . .... |
| 4. .... | |

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| TOPICS | RESOURCES |
|---|---|
| . Daily maintenance<br>. ...<br>3. Grapple placement<br>4. Grapple load<br>5. ... | |
| C. Using the pallet and winch or "Big-Stick" system<br>1. Using the winch or winch and boom<br>. Winch controls<br>. Boom controls<br>. ...<br>2. Safety hazards<br>3. Daily maintenance<br>4. ... | C. Bromley. Pulpwood Production. Unit M.<br>. Manufacturer's or operator's manuals<br>. Local loader operators<br>. .... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| D. Arrange a load such that the load has the proper weight balance on each axle.<br>1. State in writing the maximum weight per axle for a given truck and license.<br>2. Prepare a diagram showing the shape of an ideal load.<br>3. List at least two safety hazards involved in hauling an improperly loaded truck.<br>4. List at least four criteria for evaluating a well loaded truck. | D. Observe a demonstration of and/or load a truck to achieve the correct weight balance.<br>. Prepare drawings of properly loaded trucks.<br>. Obtain and file information concerning load restrictions for pulpwood trucks.<br>. .... |
| E. Transport pulpwood from the loading area to the market via a given truck.<br>1. Operate a given truck.<br>a. Diagram the gear shift positions.<br>b. Select the proper r.p.m.'s in shifting a given gear.<br>c. ....<br>2. Estimate weight per axle for a given load.<br>3. Secure a given load with a chain and binder.<br>4. Prepare a maintenance checklist.<br>5. Back a trailer to a desired location. | E. Arrange to ride with a pulpwood truck driver on a typical haul.<br>. If license and experience permit, operate a pulpwood truck on a typical haul.<br>. As a committee or class project prepare a maintenance checklist.<br>. Practice backing a trailer into a given area (could make an excellent contest of skill).<br>. Invite a local highway patrolman to discuss truck regulations with the class.<br>. Invite a local truck driver to discuss driving experiences. |

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| TOPICS | RESOURCES |
|---|---|
| D. Arranging a load on the truck<br>1. Weight restrictions per axle<br>2. Load shape<br>3. Safety hazards<br>4. Criteria for evaluating load placement<br>5. ... | D. Bromley. *Pulpwood Production*. Unit N.<br>. South Carolina Department of Motor Vehicles<br>. Local pulpwood producers<br>. Local truck operators<br>. .... |
| E. Transporting pulpwood<br>1. Truck operation<br>. Shifting<br>. Position identification<br>. R.P.M. for shifting<br>. Special road regulations<br>. Safety hazards<br>. Special safety equipment<br>. ... | E. Bromley. *Pulpwood Production*. Unit N.<br>. Local pulpwood truck drivers<br>. Local pulpwood producers<br>. Local highway patrolman<br>. .... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| 6. List at least six special highway regulations which apply to trucks, but not cars. | . Observe demonstrations of safety hazards involved in the operation of pulpwood trucks. |
| 7. List at least six safety hazards involved in driving pulpwood trucks. | . .... |
| 8. List at least ten special safety features which may be required of pulpwood trucks, e.g., heavy duty braking, special mirrors, special clearance lights, etc. | |
| 9. .... | |
| F. .... | F. .... |
| II. .... | II. .... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Loading and Hauling

| TOPICS | RESOURCES |
|---|---|
| F. .... | F. .... |
| II. .... | II. .... |

## RESOURCES

UNIT: Harvest Operations

SUB-UNIT: Loading and Hauling

| | |
|---|---|
| BOOKS<br>Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969. | FILMS and FILM STRIPS |
| BULLETINS | TRANSPARENCIES |

UNIT: Harvest Operations

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in timber harvesting with those in other areas of forestry.

II. List the ways in which a given career in timber harvesting might complement or fail to complement life goals.

III. ....

**UNIT:** Harvest Operations
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to:<br>I. Compare and contrast career opportunities in timber harvesting with those in other areas of forestry.<br>A. List the major job titles related to timber harvesting.<br>B. Classify the careers as to occupational level, i.e., professional, technical, service, etc.<br>C. List the major competencies needed for a career in timber harvesting.<br>D. List the major activities performed by persons employed in timber harvesting.<br>E. List the educational requirement for persons employed in this area and sources of such training.<br>F. .... | I. Interview as many people employed in timber harvesting as is feasible.<br>. Prepare a detailed report of the job(s) of particular interest.<br>. Arrange to spend a day or portion of a day with a person employed in timber harvesting.<br>. Seek occupational work experience as an aide to a person employed in timber harvesting.<br>. Investigate with your teacher of agriculture and/or guidance counselor the possibilities in the area.<br>. Practice as many of the tasks performed by people employed in this area as is feasible.<br>. .... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| I. Careers in timber harvesting<br>A. Career titles<br>1. Logging foreman<br>2. Chain saw operators<br>3. Trimmers<br>4. Skidder operator<br>5. Prehauler operator<br>6. Loader operator<br>7. Truck driver<br>8. ...<br>B. Career classification<br>1. Professional<br>2. Technical<br>3. Service<br>4. ...<br>C. Competencies needed<br>1. Knowledge<br>2. Skills<br>3. Attitude<br>4. ...<br>D. Major activities<br>E. Educational requirements<br>F. ... | I. Anderson and Smith. *Forests and Forestry*. Chapter I.<br>. Hanaburgh. *Your Future in Forestry*.<br>. Hoover. *Handbook of Agricultural Occupations*. Chapter XIII.<br>. Kirkley, *et al*. *Basic Forestry for Vocational Students in South Carolina*. Lesson 1.<br>. Local foresters<br>. Film: *The American Forester*, 14 1/2 min.<br>. .... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. List the ways in which a given career in timber harvesting might complement or fail to complement life goals. | II. Prepare a short paper concerning the ways in which a career in timber harvesting might complement or fail to complement life goals. |
| A. List at least five ways in which a career in timber harvesting might benefit society. | . Participate in a class debate of life goals. |
| B. List at least five ways in which a career in timber harvesting might benefit an individual. | . Investigate the living conditions and life style of a person employed in timber harvesting. |
| C. .... | . .... |
| III. .... | III. .... |

**UNIT:** Harvest Operations
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| II. Career Exploration | II. Hanaburgh. *Your Future in Forestry*. |
| A. Life goals | . Hoover. *Handbook of Agricultural Occupations*. Chapter I. |
| B. Benefits to society | . Local school guidance counselor |
| C. ... | . Local foresters |
| | . .... |
| III. .... | III. .... |

## RESOURCES

UNIT: Harvest Operations

SUB-UNIT: Exploring Careers

### BOOKS

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Hanaburgh, David H. Your Future in Forestry. New York, NY: Arco Publishing Company, Inc., 1971.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina, Clemson, SC: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

### FILMS AND FILM STRIPS

S. C. Commission of Forestry. P. O. Box 287, Columbia, South Carolina.

The American Forester, 14 1/2 min.

Man in Green, 28 min.

### BULLETINS

### TRANSPARENCIES

UNIT: Timber Processing

OBJECTIVE(S): The student will be able to:

I. When given a tree to be processed, select its most economical use or uses.

II. When given a product to be manufactured, diagram or otherwise describe the manufacturing process.

III. When given a processed wood product, classify it by grade.

IV. Diagram the layout of and/or operate a small ground sawmill.

V. ....

**UNIT:** Timber Processing
**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| The student will be able to: | |
| I. When given a tree to be processed, select its most economical use or uses, i.e., lumber, pulpwood, pole, crosstie, etc. | I-A. As a class or individual project examine various wood products to determine when possible the species of wood used. |
| A. List the major alternative uses of a given species of tree. | |
| B. Given a species of wood, list the characteristics which affect its use, i.e., hardness, stiffness, etc. | B. Obtain and file a reference which gives characteristics of woods.<br>. Interview local furniture and paper manufacturers to determine the type of wood preferred.<br>. Interview local building supply businesses to determine the type of lumber preferred. |
| C. When given a sample of one of the ten more common wood species in South Carolina, identify it. | C. Observe diagrams which show the major identifying characteristics of wood, e.g., porosity.<br>. Practice using a key to identify various woods.<br>. Prepare a wall chart of sample woods.<br>. Participate in a wood identification contest.<br>. ... |
| 1. When given a wood sample and a microscope, or hand lens, classify the sample as non-porous, ring porous, or diffuse porous. | |
| 2. When given a wood sample and a microscope, or hand lens, differentiate between spring and summer wood. | |
| 3. When given a sample of wood and a microscope or hand lens, identify rays in a section of wood. | |
| 4. ... | |

**UNIT:** Timber Processing
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| I. Selecting the most economical use of a given tree<br>A. Tree products<br>1. Pulpwood<br>2. Lumber<br>3. Veneer<br>4. Ties<br>5. Fuel<br>6. .....<br>B. Wood characteristics<br>1. Strength<br>2. Hardness<br>3. Stiffness<br>4. Beauty<br>5. Density<br>6. Grain<br>7. ..... | I-A-B. Anderson and Smith. Forests and Forestry. pp. 181-191, also pp. 191-202.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 14.<br>. Local builders<br>. Local manufacturers - lumber, pulpwood, furniture<br>. U. S. Forest Service. What We Get From Trees. (a wall chart)<br>. ..... |
| C. Wood identification<br>1. Porosity<br>. Non-porous<br>. Ring porous<br>. Diffuse porous<br>2. Rays (visibility)<br>3. Growth rings (visibility)<br>4. Summer wood characteristics<br>5. Heartwood color texture<br>6. ...... | C. Anderson and Smith. Forests and Forestry. pp. 177-181.<br>. Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 14.<br>. Local foresters<br>. ..... |

UNIT: Timber Processing
SUB-UNIT:

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. When given the product to be produced, diagram or otherwise describe the manufacturing process. | II. Visit local processing plants and observe the major manufacturing processes in operation. |
| A. Diagram or otherwise describe the processing of a typical log into a given product or products. | A-1. Prepare and/or obtain a diagram showing the major components of a modern sawmill. |
| 1. Diagram or otherwise describe the processing of a typical log into 1" boards. | . Visit a modern sawmill and observe the major manufacturing processes in operation. |
| a. List the components of a given type sawmill. | . ..... |
| b. Diagram the working principle of each component of a given sawmill. | |
| c. List the processes and sequences of processes which take place from the delivery deck until the totally processed 1" board is produced. | |
| d. ..... | |
| 2. Diagram or otherwise describe the processing of a tree into a paper product. | 2. Visit a local pulp and papermill and observe the major manufacturing processes. |

**UNIT:** Timber Processing

**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| II. Manufacturing processes<br>A-1. Lumber production<br>a. Sawmill components<br>b. Major processes<br>c. ..... | II-A-1. Anderson and Smith. *Forests and Forestry*. pp.206-213.<br>. Local manufacturers |
| 2. Paper production<br>a. Mill components<br>b. Major processes<br>c. ..... | 2. Bromley. *Pulpwood Production*. pp. 3-12.<br>. Local pulp and paper manufacturers<br>. ..... |

UNIT: Timber Processing
SUB-UNIT:

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| a. List the major components of a papermill. | |
| b. Diagram or otherwise describe the major processes involved in the manufacture of paper. | |
| c. ..... | |
| 3. Diagram or otherwise describe the processing of a log into plywood or veneer. | 3. Visit a local veneer plant and observe the major processes involved in the production of veneer and plywood. |
| a. List the major components of a plywood or veneer mill. | . Ask a veneer or plywood plant representative to visit the class and diagram or otherwise describe the major processes involved in the manufacture of veneer and plywood. |
| b. Diagram or otherwise describe the major processes involved in the manufacture of plywood or veneer. | . Prepare and/or obtain a diagram showing the major components of a veneer and plywood plant. |
| c. ..... | . ..... |
| B. ..... | B. ..... |

**UNIT:** Timber Processing

**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| 3. Veneer and plywood production | 3. Anderson and Smith. *Forests and Forestry*. pp. 210-211. |
| a. Mill components<br>b. Major processes<br>c. ..... | . Local veneer and plywood manufacturers<br>. ..... |
| B. ..... | B. ..... |

UNIT: Timber Processing

SUB-UNIT:

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| III. Given a finished timber product, grade it. | III. While visiting local processing plants, observe the grading of the finished products. |
| A. Given a 1" board and the purpose for which it is to be used, classify it according to grade. | . Obtain and file grade standards for various products. |
| 1. List the major grades of lumber.<br>2. List the major criteria used for grading lumber.<br>3. ..... | . Practice grading various types of lumber.<br>. Practice grading veneer or plywood.<br>. Practice grading fence posts. |
| B. Given a piece of veneer or plyboard and the purpose for which it is to be used, classify it by grade. | . Prepare or obtain specimen grades of lumber and veneer. |
| 1. List the major grades of plywood.<br>2. List the major criteria used for grading lumber.<br>3. ..... | . ...... |
| C. Given a processed fence post, classify it according to grade. | |
| 1. List the major grades of fence post.<br>2. List the major criteria used for grading fence posts.<br>3. ..... | |
| D. ..... | |

UNIT: Timber Processing
SUB-UNIT:

| TOPICS | RESOURCES |
|---|---|
| III. Grading finished products<br>A. Grading lumber<br>1. Grades<br>2. Criteria for grade<br>3. .....<br>B. Grading veneer or plyboard<br>1. Grades<br>2. Criteria for grade<br>3. .....<br>C. Grading fence post<br>1. Grades<br>2. Criteria for grade<br>3. .....<br>D. ..... | III. Anderson and Smith. Forests and Forestry. pp. 194-202.<br>. Local graders<br>. ..... |

**UNIT:** Timber Processing

**SUB-UNIT:**

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| IV. Diagram the layout of and/or operate a small ground sawmill. | IV.-A. Visit a ground sawmill and observe the layout of the major parts. |
| A. Diagram the layout of a small ground sawmill. | . Prepare a diagram of a small ground mill. |
| 1. Diagram the layout of a log deck. | . ..... |
| 2. Diagram the layout of a carriage track. | |
| 3. Diagram the layout of a saw and belt box. | |
| 4. Diagram the layout of the edger. | |
| 5. Diagram the layout of the butt saw. | |
| 6. Diagram the layout of the engine. | |
| 7. ..... | |
| B. Operate a small ground sawmill. | B. Visit a local ground mill and with the consent of the owner, divide up into observation teams to understudy different workers - log turners, sawyers, edgers, green hand. |
| 1. Perform the duties of a log turner. | |
| 2. Perform the duties of a sawyer. | |
| 3. Perform the duties of an edger. | . After understudying the career,and with the aid and supervision of the crew, take over operation of the mill for a short period of time - rotate stations. |
| 4. Perform the duties of a "green-end" hand. | |
| 5. ..... | . As a class project,purchase an old ground mill. |
| C. ..... | C. ..... |
| V. ..... | V. ..... |

**UNIT:** Timber Processing
**SUB-UNIT:**

| TOPICS | RESOURCES |
|---|---|
| IV. Ground mill layout and operation | IV. Local ground mill operators |
| A. Layout | . ..... |
| 1. Log deck | |
| 2. Carriage track | |
| 3. Saw and belt box | |
| 4. Edger | |
| 5. Butt saw | |
| 6. Engine | |
| 7. ..... | |
| B. Operational jobs | |
| 1. Log turner | |
| 2. Sawyer | |
| 3. Edger | |
| 4. Green hand (butt saw operator) | |
| 5. ..... | |
| C. ..... | C. ..... |
| V. ..... | V. ..... |

## RESOURCES

## UNIT: Timber Processing

### BOOKS

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Bromley, W. S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1970.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, S. C.: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

### FILMS AND FILM STRIPS

South Carolina State Commission of Forestry, P. O. Box 287, Columbia, S. C. 29202. From Trees to Lumber, 14 min.; From Trees to Paper, 14 min.

### BULLETINS

### TRANSPARENCIES

Wall Charts - Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. What We Get From Forest Land, 20¢. What We Get From Trees, 20¢.

UNIT: Timber Processing

SUB-UNIT: Exploring Careers

OBJECTIVE(S): The student will be able to:

I. Compare and contrast career opportunities in the timber processing with those in other areas of forestry.

II. List the ways in which a given career in the timber processing might complement or fail to complement life goals.

III. ....

**UNIT:** Timber Processing
**SUB-UNIT:** Exploring Careers

**OBJECTIVES**

The student will be able to:

I. Compare and contrast career opportunities in timber processing with those in other areas of forestry.

   A. List the major job titles related to timber processing.

   B. Classify the careers as to occupational level, i.e., professional, technical, service, etc.

   C. List the major competencies needed for a career in timber processing.

   D. List the major activities performed by persons employed in timber processing.

   E. List the educational requirement for persons employed in this area and sources of such training.

   F. ....

**LEARNING ACTIVITIES**

I. Interview as many people employed in timber processing as is feasible.

- Prepare a detailed report of the job(s) of particular interest.
- Arrange to spend a day or portion of a day with a person employed in timber processing.
- Seek occupational work experience as an aide to a person employed in timber processing.
- Investigate with your teacher of agriculture and/or guidance counselor the possibilities for further training and job opportunities in the area.
- Practice as many of the tasks performed by people employed in this area as is feasible.
- ....

**UNIT:** Timber Processing
**SUB-UNIT:** Exploring Careers

## TOPICS

I. Careers in timber processing

- A. Career titles
    - 1. Mill manager
    - 2. Sawyer
    - 3. Lumber checker
    - 4. Loader operator
    - 5. ....
- B. Career classification
    - 1. Professional
    - 2. Technical
    - 3. Service
    - 4. ...
- C. Competencies needed
    - 1. Knowledge
    - 2. Skills
    - 3. Attitude
    - 4. ...
- D. Major activities
- E. Educational requirements
- F. ...

## RESOURCES

I. Anderson and Smith. Forests and Forestry. Chapter I.

- Hanaburgh. Your Future in Forestry.
- Kirkley, et al. Basic Forestry for Vocational Students in South Carolina. Lesson 1.
- Hoover. Handbook of Agricultural Occupations. Chapter XIII.
- Local foresters
- Film: The American Forester, 14 1/2 min.
- Film: Man in Green, 28 min.
- ....

**UNIT:** Timber Processing
**SUB-UNIT:** Exploring Careers

| OBJECTIVES | LEARNING ACTIVITIES |
|---|---|
| II. List the ways in which a given career in timber processing might complement or fail to complement life goals. | II. Prepare a short paper concerning the ways in which a career in timber processing might complement or fail to complement life goals. |
| A. List at least five ways in which a career in timber processing might benefit society. | . Participate in a class debate of life goals. |
| B. List at least five ways in which a career in timber processing might benefit an individual. | . Investigate the living conditions and life style of a person employed in timber processing. |
| C. .... | . .... |
| III. .... | III. .... |

**UNIT:** Timber Processing
**SUB-UNIT:** Exploring Careers

| TOPICS | RESOURCES |
|---|---|
| II. Career Exploration | II. Hoover. Handbook of Agricultural Occupations. Chapter I. |
| A. Life goals | . Hanaburgh. Your Future in Forestry. Chapter IV. |
| B. Benefits to society | . Local school guidance counselor |
| C. ... | . Local foresters |
| | . .... |
| III. .... | III. .... |

## RESOURCES

UNIT: Timber Processing

SUB-UNIT: Exploring Careers

### BOOKS

Anderson, David A. and W. A. Smith. *Forests and Forestry*. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Hanaburgh, David H. *Your Future in Forestry*. New York, NY: Arco Publishing Company, Inc. 1971.

Hoover, Norman K. *Handbook of Agricultural Occupations*. Danville, Illinois: The Interstate Printers and Publishers, Inc., Second edition, 1969.

Kirkley, Frank E. *et al*. *Basic Forestry for Vocational Students in South Carolina*, Clemson, SC: Vocational Education Media Center in cooperation with the South Carolina Division of Vocational Education, 1974.

### FILMS AND FILM STRIPS

S. C. Commission of Forestry. P. O. Box 287, Columbia, South Carolina.

*The American Forester*, 14 1/2 min.

*Man in Green*, 28 min.

### BULLETINS

### TRANSPARENCIES

# Appendix A

## Facilities and Equipment

Facilities:

- Regular Ag. Ed. classroom
- Access to the Ag. Ed. shop
- Access to a bus for field trips
- Access to a forestry plot

. . . . . .

Equipment by Unit:

Establishment and Management of Forests Units

- Planting bars (10)
- Planting mattock (5)
- Access to a tree planter
- Transit (1)
- Biltmore sticks (10)
- Diameter tapes (10)
- Clinometer (1)
- International rule (1)
- Doyle rule (1)
- Compasses (10)
- Chain tapes (5)
- Hand tree marking guns (5)
- Increment borer
- Soil sampling tube

Timber Processing Unit

- Gloves (10 pair)
- Access to a small ground mill

. . . . . .

Forest Fire Control

- Fire pumps (2)
- Flame spreader (1)
- Fire swatters (2)
- Fire hand rakes (2)
- Shovels (2)
- Access to a fire plow

. . . . . .

Forest Recreation:

- Access to or ownership of camping equipment
  - Tent or tents
  - Sleeping bags
  - Lanterns
  - Stoves
  - First aid kit
  - Cookware
  - . . . . . .

Harvesting Units:

- Hard hats (15)
- Leg guards (10 pair)
- Bow-blade chain saw (1)
- Straight-blade chain saws (2)
- Axes (5)
- Steel wedges (2)
- Cant hook (1)
- Tree injector (1)

Access to:

- Hydraulic shears
- Skidders
- Prehauler
- Loaders
  - Fork lift types
  - Knuckle-boom type (actual or scale model)
  - . . . . . .
- Trucks

Forestry Machinery and Mechanics:

If agricultural mechanics is taught in the school, additional equipment will probably not be needed.

521

522

# APPENDIX B

The following list is incomplete. Inclusion does not imply approval; omission does not imply disapproval. Teachers or students may obtain helpful information by writing the executive secretary of the respective organizations.

United States:

Professional Organizations:

American Forestry Institute, 1835 K Street, N.W., Washington, DC 20006.
American Forest Products Industries, 1816 N Street, N.W., Washington, DC 20006.
The American Forest Association, 1319 18th Street, N.W., Washington, DC 20036.
American Pulpwood Association, 605 Third Avenue, New York, NY 10016.

Agencies:

U.S. Forest Service, South Agriculture Building, Washington, DC 20250.
Southeastern Area, State and Private Forestry, U.S.F.S., 50 Seventh Street, N.E., Atlanta, Ga. 30323.
Region 8, U.S.F.S., 50 Seventh Street, N.E., Atlanta, Ga. 30323.
Southeastern Forest Experiment Station, U.S.F.S., Post Office Building, P.O. Box 2570, Asheville, NC 28802.
Southern Forest Experiment Station, U.S.F.S., T-10210 Federal Building, 701 Loyola Avenue, New Orleans, La. 70113

South Carolina:

State Commission of Forestry, 5500 Broad River Road, Columbia, SC 29202.

# BIBLIOGRAPHY

## BOOKS:

American Association for Vocational Instructional Materials. Farm Tune-up and Service Specifications. Athens, GA: The Association, 1972.

American Association for Vocational Instructional Materials. Selecting and Storing Tractor Fuels and Lubricant. Athens, Georgia: The Association, 1964.

American Association for Vocational Instructional Materials. Small Engines, Vol. I. Athens, GA: The Association, 1971.

American Association for Vocational Instructional Materials. Small Engines, Vol. II. Athens, GA: The Association, 1971.

American Association for Vocational Instructional Materials. Tractor Maintenance. Athens, GA: The Association, 1964.

American Association for Vocational Instructional Materials. Tractor Hydraulics. Athens, GA: The Association.

American Association for Vocational Instructional Materials. Tractor Operation and Daily Care. Athens, GA: The Association, 1967.

Andrews, William A. A Guide to the Study of Fresh Water Ecology. Englewood Cliffs, N.J: Prentice-Hall, Inc., 1972.

Anderson, David A. and W. A. Smith. Forests and Forestry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Bender, Ralph E.; Clark, Raymond and Taylor, Robert E. The FFA and You. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1962.

Binkley, Harold and Hammonds, Carsie. Experience Programs for Learning Vocations in Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970.

Bromley, W.S. Pulpwood Production. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1970.

Byram, Harold M. Guidance in Agricultural Education, Danville, Illinois: The Interstate Printers and Publishers, Inc.

Deere and Company. Moline, Illinois: Deere and Company.

Fundamentals of Service-Engines, 1968.
Fundamentals of Service-Fuels, Lubricants and Coolants, 1970.
Fundamentals of Service-Hydraulics, 1967.

Donnelly, Joseph D., William G. Helms and Elmer D. Mitchell. Active Games and Contests. New York: The Ronald Press Company, 1958.

Fanning, Odom. Opportunities in Environmental Careers. New York: Universal Publishing and Distributing Company, 1971.

Fuller, Gerald R. Education for Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc.

Glenn, Ronald E. and James E. Baine. Mobile Hydraulic Testing. Chicago: American Technical Society, 1970.

Griffin, Ivan and Roden, Edward M. Basic Oxyacetylene Welding. Albany, NY: Delmar Publishers, 1960.

Hanaburgh, David H. Your Future in Forestry. New York, NY: Arco Publishing Company, Inc., 1971.

Hoover, Norman K. Handbook of Agricultural Occupations. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1969.

Kirkley, Frank E. et al. Basic Forestry for Vocational Students in South Carolina. Clemson, SC: Office of Vocational Education in cooperation with the Vocational Education Media Center, 1974.

McCormick, Jack. The Life of the Forest. New York, NY: McGraw-Hill Book Company, 1966.

Merrill, Bill. The Hikers and Backpackers Handbook. New York: Winchester Press, 1971.

Miller, Texton R. Supervised Practice in Vocational Agriculture. Danville, Illinois: The Interstate Printers and Publishers, Inc.

Mississippi State Board of Vocational Education. A Reference Unit on Basic Principles of Plant Science. College State, Mississippi.

O'Brien, Michael. Demonstrations for Farm Mechanics. Danville, Illinois: The Interstate Printers and Publishers.

Rutledge, Albert F. Anatomy of a Park. New York: McGraw-Hill, 1971.

Smith, Clodus R., Lloyd E. Partain and James R. Champlin. Rural Recreation for Profit. Danville, Illinois: The Interstate Printers and Publishers, Inc., 2nd edition, 1968.

Spurr, Stephen H. Forest Ecology. New York, NY: The Ronald Press Company, 1964.

U.S. Department of Interior. Community Action Program for Outdoor Recreation. Washington, DC: Superintendent of Documents.

U.S. Department of Health, Education and Welfare. Exploring Occupations in the Natural Resources. A Resource Guide for Grades 7-8-9. Washington, D.C.: U.S. Government Printing Office, 1973.

U.S. Department of Agriculture. Outdoors USA, The Yearbook of Agriculture, 1967. Washington, D.C.: U.S. Government Printing Office.

Vocational Education Media Center. Clemson, SC: The Center, 1972.

Small Gasoline Engines - Bowl-Type Carburetor Repair.
Small Gasoline Engines - Ignition System Repair.

Wakeman, T.J. and McCoy, Vernon. The Farm Shop. New York: The MacMillan Company, 1960.

Wilson, B.F. The Growing Tree. Amherst, Mass.: The University of Massachusetts Press, 1970.

527

527A

FILMS AND FILMSTRIPS:

American Association for Vocational Instructional Materials, Athens, GA.

Slides:
Selecting and Storing Tractor Fuel and Lubricants.
Tractor Maintenance.
Tractor Operation and Daily Care.

Colonial Films, Atlanta, Georgia. Identifying Common Tree Species. Filmstrips I, II, and III.

South Carolina State Commission of Forestry, P.O. Box 287, Columbia, S.C. 29202.

Adventures in Conservation. 11. min.
Beyond the Suburbs. 14 1/2 min.
Caught in the Act. 14 1/2 min.
Dead Out. 20 min.
Control of Low Grade Hardwoods. 11 min.
From Trees to Lumber. 14 min.
From Trees to Paper. 14 min.
Frying Pan and the Fire. 20 min.
Forest Fire Fighting in the South. 39 min.
Just Beyond the Chalkboard. 23 min.
Lay it on the Line. 22 min.
Life in the Deciduous Forest. 19 min.
Life in the Forest. 10 min.
Living Forest Series:
    Part I - The Forest Grows. 11 min.
    Part II - The Forest Produces. 11 min.
    Part III - Forest Conservation. 11 min.
Man Against Fire. 28 min.
Man in Green. 28 min.
Never the Easy Way. 13 1/2 min.
Pamela's Tree. 13 1/2 min.
Plant - Animal Communities: Ecological Succession.
Seasonal Changes in Trees. 10 min.
Smokey's Story. 12 min.

528 A

528

Suppression Burning. 20 min.
Talent for Disaster. 19 min.
The American Forester. 14 1/2 min.
The Tree Farm. 13 1/2 min.
The Burning Issue. 14 min.
The Careless Crime. 14 1/2 min.
Time Lapse Study of the Growth of Trees. 10 min.
Times Running Out. 20 min.
Tree and Shrub Planting. 11 1/2 min.
What it Takes. 13 1/2 min.

USDA. Tent Flaps and Flapjacks. Film: 25 1/2 min. Available from State Film Library, Columbia, South Carolina.

BULLETINS:

Clemson University Extension Service in cooperation with the South Carolina State Commission of Forestry. Clemson University, Clemson, SC. Forest Insects and Diseases of South Carolina Trees. Bulletin 116. Chemical Control of Low Grade Hardwoods in South Carolina. Information card #90.

Clemson University in cooperation with the USDA. Clemson University, Clemson, SC. Controlling Upland Hardwoods in South Carolina. Circular 385.

S.C. State Forestry Commission and Clemson University Extension Foresters. Clemson University, Clemson, S.C.:

Forest Tree Planting Guide. Information #88.
Getting Open Land Ready for Planting Pines. Information card #93.
Forest Insects and Diseases of South Carolina Trees. Bulletin 116.

South Carolina Commission of Forestry, P.O. Box 287, Columbia, SC. 29202. Investigating Your Environment Series - "A Lesson Plan for Investigating a Forest Environment."

S.C. State Commission of Forestry. Familiar Trees in South Carolina. A manual for tree study. Bulletin 117, Box 287, Columbia, SC 29202.

USDA. Washington, DC, Forest Service, State and Private Forestry - Southeastern Area Forest Pest Management Group. Insects and Diseases of Trees in the South.

TRANSPARENCIES:

Vocational Education Media Center, 109 Freeman Hall, Clemson University, Clemson, SC. Plant Science Transparencies.

Wall Charts - Superintendent of Documents, U.S. Government Printing Office, Washington, DC. What We Get From Forest Land, 20¢. What We Get From Trees, 20¢.